ST. MARY'S COLLEGE (Autonomous)

(Re-accredited with 'A^{+}' Grade by NAAC)

Thoothukudi-628001, Tamil Nadu

(Affiliated to Manonmaniam Sundaranar University)

B.Sc. Physics

School of Physical Sciences

Outcome Based Curriculum

(W.e.f.2021)

PREAMBLE

The Department of Physics provides instructional programs in introductory Physics to a broad range of students through an understandable and effective method that enables them to integrate this knowledge into their normal thought processes. The department provides a forward-looking curriculum to undergraduate students of both major and allied departments with the basic concepts of Physics in a broader level and also provides the latest experimental techniques, computational Physics and the use of computers in data acquisition and analysis, as well as active involvement in professional research.

VISION

To build a foundation for excellence by igniting and promoting enthusiasm, interest and passion in learning physics and thus create globally competent Physicists.

MISSION

The Physics department is committed to impart quality education to awaken the young minds both in theoretical as well as experimental Physics with special emphasis on ‘learning by doing’ for socio-economic growth.

PROGRAMME OUTCOMES

PO.No	After completion of the Undergraduate programme the students of St. Mary's College will be able to
PO 1	develop language, numerical, experimental, analytical and computing skills.
PO 2	pursue higher education programmes.
PO 3	excel in the recent trends of the world, enhancing the level of knowledge to emerge as aholistic person.
PO 4	function effectively as an individual in multidisciplinary settings and develop their ethical, social and cultural values to serve the nation.
PO 5	be proficient in the fields of Arts, Science and Management Studies to qualify for thejob.
PO 6	develop their communicative skills using a range of technologies which enable them to express their ideas and views effectively.
PO 7	become an environmentally conscious citizen.
PO 8	be an empowered and economically independent woman with efficient leadership qualities in an egalitarian society through liberative education.

PROGRAMME SPECIFIC OUTCOMES

PSO No.	Upon completion of B.Sc. Physics Degree programme, the graduates will be able to	PO Mapped
PSO – 1	acquire knowledge of mechanics, wave oscillations, acoustics, properties of matter, optics, thermal physics, electricity and electromagnetism to analyze a variety of physical phenomena.	PO – 1
PSO – 2	obtain knowledge in electronics and communication, digital electronics, solid state physics, optoelectronics, modern physics, bio physics, atomic physics, nuclear energy, relativity and quantum mechanics and fibre optics communication to become competent to pursue higher education	PO – 2
PSO – 3	utilize their knowledge about renewable energy sources to solve the present day energy crisis	PO – 3
PSO –4	gain knowledge about computational Physics, laser, superconductivity, thin films, polymer materials, sensors, biophysics, nanophysics, electrical appliances, maintenance of electronic equipment and photography, wiring and domestic appliances.	PO – 5
PSO –5	adapt easily into the workplace to become communicatively competent by learning professional English for Physics	PO – 6
PSO –6	design, set up and carryout experiments, infer data, account for errors and compare with theoretical predictions	PO – 1
PSO –7	recognize the impact of environmental issues and manage the natural disasters and use the natural resources for more sustainable way of living	PO – 7
PSO –8	develop physical and psychological health of women and gain awareness on legal rights and become an empowered women through various domains	PO – 8

Department of Physics
Course Structure (w.e.f. 2021)

Semester –I

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil / French	21ULTA11 21ULFA11	பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை) Introductory French Course	6	3	40	60	100
II	General English	21UGEN11	Poetry, Prose, Extensive Reading and Communicative English-I	6	3	40	60	100
III	Core I	21UPHC11	Mechanics and Properties of Matter	6	5	40	60	100
	Core practical I	21UPHCR1	Practical I	2				
	Allied I	21UCHA11	Allied Chemistry	4	3	40	60	100
	Allied Practical I	21UCHAR1		2				
IV	Skill Enhancement Course – I	21UPHPE1	Professional English for Physics – I	2	2	20	30	50
	Ability Enhancement Course – I	21UAVE11	Value Education	2	2	20	30	50
Total				**30**	**18**			

Semester II

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil /	21ULTA21	பொதுத்தமிழ் தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, வாழ்க்கை வரலாறு)	6	3	40	60	100
	French	21ULFA21	Intermediate French Course					
II	General English	21UGEN21	Poetry, Prose, Extensive Reading and Communicative English –II	6	3	40	60	100
III	Core II	21UPHC21	Thermal Physics and Optics	6	5	40	60	100
	Core Practical I	21UPHCR1	Practical I	2	2			
	Allied I	21UCHA22	Allied Chemistry	4	3	40	60	100
	Allied Practical I	21UCHAR1		2	2			
IV	Skill Enhancement Course – II	21UPHPE2	Professional English for Physics – II	2	2	20	30	50
	Ability Enhancement Course	21UAEV21	Environmental Studies	2	2			
			Total	**30**	**22**			

Semester III

Part	Components	Course Code	Course Title	Hrs/ Week	Credit	Max. Marks		
						CIA	ESE	Total
I	Tamil / French	21ULTA31 21ULFA31	பொதுத்தமிழ் தாள் 3 : காப்பியங்களும் சிற்றிலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்) Advanced French Language	6	4	40	60	100
II	General English	21UGEN31	Poetry, Prose, Extensive Reading and Communicative English- III	6	4	40	60	100
III	Core III	21UPHC31	Electricity and Electromagnetism	4	4	40	60	100
	Core Practical II	21UPHCR2	Practical II	2				
	Allied II	21UMAA31	Allied Mathematics	6	5	40	60	100
	Skill Based Elective	21UPHS31	Instrumentation Physics	2	2			
	NME I	21UPHN31	Applied Physics I	2	2	20	30	50
IV	Ability Enhancement Course	21UAWS31	Women's Synergy	2	2			
	Self Study Course / MOOC/ Internship (Compulsory)	21UPHSS1/ 21UPHO31/ 21UPHI31	Maintenance of Electronic Equipment and Photography		2		50	50
Total				**30**	**25**			

Semester IV

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil / French	21ULTA41 21ULFA41	பொதுத்தமிழ் தாள் 4: சங்க இலக்கியம்: (செய்யுள், இலக்கணம்,இலக்கிய வரலாறு, உரைநடை, நாடகம்) French Course and Literature	6	4	40	60	100
II	General English	21UGEN31	Poetry, Prose, Extensive Reading and Communicative English- IV	6	4	40	60	100
III	Core IV	21UPHC41	Electronics and Communication	4	4	40	60	100
	Core Practical II	21UPHCR2	Practical IV	2	2			
	Allied II	21UMAA41	Allied Mathematics	6	5	40	60	100
	Skill Based Elective	21UPHS41	Physics for Competitive Examinations	2	2	40	60	100
	NME II	21UPHN41	Applied Physics II	2	2	20	30	50
IV	Ability Enhancement Course	21UAYM1	Yoga & Meditation	2	2			
	Self study / Online Course / Internship (Optional)	21UPHSS2/ 21UPHO41/ 21UPHI41	Electrical Wiring and Appliances		+2		50	50
V	NCC, NSS & Sports				1			
	Extension Activities CDP				+1			
Total				**30**	**26+3**			

Semester V

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
III	Core V (Common Core)	21UPCC51	Material Science	6	5	40	60	100
	Core VI	21UPHC51	Digital Electronics	5	5	40	60	100
	Core VII	21UPHC52	Computational Physics	5	5	40	60	100
	Core Elective	21UPHE51/ 21UPHE52	Renewable Energy Sources/ Mathematical Physics	4	4	40	60	100
	Core Practicals III, IV & V	21UPHCR3	Practical – V (Non electronics)	3				
		21UPHCR4	Practical - VI (Electronics)	3				
		21UPHCR5	Practical – VII (Programming in C++)	2				
IV	Common Skill Based	21UCSB51	Computers for Digital Era and Soft Skills	2	2	20	30	50
	Self study / MOOC / Internship (Optional)	21UPHSS3/ 21UPHO51/ 21UPHI51	Biophysics	--	+2		50	50
Total				**30**	**21+2**			

Semester VI

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
III	Core VIII	21UPHC61	Relativity and Quantum Mechanics	5	5	40	60	100
	Core IX	21UPHC62	Atomic and Nuclear Physics	4	4	40	60	100
	Core X	21UPHC63	Opto Electronics And Fibre Optics Communication	4	4	40	60	100
	Core XI	21UPHC64	Advanced Physics	4	4	40	60	100
	Core Practicals III, IV & V	21UPHCR3	Practical – V (Non electronics)	3	2			
		21UPHCR4	Practical - VI (Electronics)	3	2			
		21UPHCR5	Practical – VII (Programming in C++	2	2			
IV	Core XII / Project	21UPHC65	Microprocessor 8086 and Microcontroller	5	5	40	60	100
			Total	**30**	**28**			

Semester	Hours	Credits	Extra Credits
I	30	18	---
II	30	22	---
III	30	25	---
IV	30	26	3
V	30	21	2
VI	30	28	--
Total	**180**	**140**	**5**

Courses	**Number of Courses**	**Hours / week**	**Credits**	**Extra Credits**
Tamil	4	24	14	--
English	4	24	14	--
Core	11 T + 5 P	53 + 24	60	
Core Skill Based	2	4	4	--
Core Elective	1	4	4	--
Group Project	1	5	3	--
Allied	4 T + 1P	20 + 4	20	
NME	2	4	4	--
Skill Enhancement Course	2	4	4	--
Ability Enhancement Course	4	8	8	--
Common Skill Based	1	2	2	--
NCC, NSS & Sports		--	1	
Extension Activities		--		1
Self Study Papers (Optional)	2	--		4
Self Study Papers (Compulsory)	1	--	2	--
Total		**180**	**140**	**5**

பாடத்திட்டத்தின் நோக்கங்கள்

1. அனைத்துத் துறைமாணவர்களும் பயன்பெறும் வகையில் பாடத்திட்டம் வரையறை செய்யப்பட்டுள்ளது.
2. தமிழ் இலக்கியக் கல்வியை எளிமையுடன் ஆழமாக்கிக் கற்பிக்கும் விதமாக இக்கால இலக்கியம் தொடங்கி சங்க இலக்கியம் வரைகற்பித்தல்.
3. தமிழ் மொழியில் பிழையின்றிக் கற்கும் விதமாக எழுத்து, சொல், பொருள், யாப்பு,அணி என இலக்கணத்தைப் பயிற்றுவித்தல்.
4. மாணவர்களின் நலன் கருதி இலக்கிய வரலாற்றுப் பகுதியானது செய்யுள்அமைப்பிற்கேற்ப வகைப்படுத்தப்பட்டுக் கற்பிக்கப்படுதல்.

பயன்கள்

1. காலந்தோறும் வளர்ந்துவரும் தமிழ்க் கவிதைகளின் வடிவினையும், கருத்தோட்டத்தினையும் மாணவியர் அறிந்துகொள்வர்.

2. தமிழ் மொழியைப் பிழையின்றி எழுதவும் பேசவும் முடியும்.

3. தன்னம்பிக்கை உருவாகும்

4. தகவல் தொடர்புச் சாதனங்கள் தமிழ் வளர்ச்சிக்குப் பயன்படுவதை அறிந்துகொள்வர்.

5. படைப்பாற்றலை வளர்த்துக் கொள்வர்.

6. தமிழ் இலக்கியங்கள் அன்று முதல் இன்றுவரை பெற்றுவரும் சிறப்பை உணர்வர்.

7. இலக்கியவரலாற்றின் வழி மொழியின் வளர்ச்சியையும் காலந்தோறும் மாறிவரும் இலக்கியங்களின் பல்வேறு வகைகளையும் தெரிந்துகொள்வர்.

8. துறைதோறும் தமிழ் மொழியின் வளர்ச்சியை அறிவர்.

9. சங்கம் வைத்துத் தமிழாய்ந்த மன்னர், புலவர், மக்கள் இவர்களின் வாழ்வியல் அறங்களைக் கண்டறிவர்.

10. பண்பாட்டுச் சிறப்பினை மொழியின் வழி அறிந்து தம் வாழ்வில் கடைப்பிடிப்பர்.

11. வேலை வாய்ப்பிற்கான தேர்வுகளில் திறமையுடன் பங்கேற்பர்.

SEMESTER - 1			
Part – 1 பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை)			
Course Code: 21ULTA11	**Hrs/Week:6**	**Hrs/Semester: 90**	**Credits: 3**

Objectives:

- மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து வாழ்வில் அவற்றைப் பின்பற்ற வழிவகுத்தல்.
- இலக்கிய மாந்தரின் வாழ்க்கை அனுபவங்கள் மூலம் வாழ்வில் பிரச்சனைகளைஎதிர்கொள்ளும் திறம், தன்னம்பிக்கை, ஆளுமைத்திறம், மொழிஅறிவு இவற்றை உருவாக்குதல்.

Course Outcome:

CO.NO	**இப்பாடத்திட்டம் மாணவியருக்கு**	**அறிவுசார் மதிப்பீடு**
CO-1	பெண் சார்ந்த விடுதலை, பொதுமைச் சிந்தனை உணர்வையும் வளர்க்கிறது	வளர்ச்சி
CO-2	இயற்கையைப் பேணுதற்கும் வாழ்வின் வளர்ச்சி நிலையை மேம்படுத்திக் கொள்ளுதற்கும் உதவுகிறது.	நடைமுறைப்படுத்துதல்
CO-3	சமய நல்லிணக்கம், ஒற்றுமை உணர்வு, இறை நம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்
CO-4	மொழியைப் பிழையின்றி பேசவும் எழுதவும் உதவுகிறது.	புரிதல் திறன் மேம்பாடு
CO-5	தனிமனித வாழ்க்கைச் சிக்கல்கள், சமுதாயப் பிரச்சனைகள் எதிர்கொள்ளும் திறனை எடுத்துரைக்கிறது.	நடைமுறைப்படுத்துதல்
CO-6	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல் திறன் மேம்பாடு

SEMESTER - 1			
Part – 1 பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை)			
Course Code: 21ULTA11	Hrs/Week:6	Hrs/Semester: 90	Credits: 3

அலகு – 1 செய்யுள் - 2 மணி

1. தமிழ்மொழி வாழ்த்து – பாரதியார்
2. புதுமைப் பெண் - பாரதியார்
3. புதிய உலகு செய்வோம் - பாரதிதாசன்
4. உலகை மாற்றுவோம் - கவியரசு முடியரசன்
5. கண்ணீரின் இரகசியம் - அப்துல் ரகுமான்
6. மரங்கள் - மு.மேத்தா
7. கால வித்தியாசம் - வைரமுத்து
8. வையத்தை வெற்றி கொள்ள - சி.சிவரமணி
9. கவிதைப் பூங்காடு – பா.விஜய்
10. பெண் இனமே – மைத்ரேயி
11. ஹைக்கூ கவிதைகள்
12. நாட்டார் பாடல்கள்

அ. தாலாட்டுப் பாடல்

ஆ. மீனவர் பாடல்

அலகு - 2 இலக்கணம் - 1 மணி

எழுத்து

1. எழுத்து - விளக்கம்,
2. முதலெழுத்துகள், சார்பெழுத்துகள்
3. சுட்டெழுத்துகள், வினா எழுத்துகள்
4. மொழி முதல் எழுத்துகள், மொழி இறுதி எழுத்துகள்
5. வல்லினம் மிகும் இடங்கள், வல்லினம் மிகா இடங்கள்
6. மொழிப்பயிற்சி : புதுக்கவிதை, சிறுகதை, பத்திரிகைக்குச் செய்தி அனுப்புதல்

அலகு - 3 இலக்கிய வரலாறு - 1 மணி

1. புதுக்கவிதை தோற்றமும் வளர்ச்சியும்
2. சிறுகதை தோற்றமும் வளர்ச்சியும்
3. உரைநடை தோற்றமும் வளர்ச்சியும்
4. நாட்டுப்புற இயல் அறிமுகம்

அலகு - 4 உரைநடை - 1 மணி

நீயே வெல்வாய் - க.ப.அறவாணன்

அலகு – 5 சிறுகதை - 1 மணி

1. கேதாரியின் தாயார் - கல்கி
2. விடியுமா? - கு.ப.ராஜகோபாலன்
3. காலனும் கிழவியும் - புதுமைப்பித்தன்
4. கருப்பண்ணசாமி யோசிக்கிறார் - அறிஞர் அண்ணா
5. நாற்காலி - கி.ராஜநாராயணன்
6. ராஜா வந்திருக்கிறார் - அழகிரி சாமி
7. ஜோடிப் பொருத்தம் - ஜெயரதி அகஸ்டின்

I B.A., / B.Sc Part I FRENCH

SEMESTER – I			
Course Title : PART – I French Paper – I Introductory French Course			
Course Code :21ULFA11	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Objectives

To initiate a beginner to the francophonic world and to train them to make their maiden efforts in spoken and written French.

To create a number of real-life situations to make the learner express herself in the target language through experiential teaching method.

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	make the initial conversation in French	Un, Re
2.	understand the basic sentence structures and make sentences of their own	Un, Ap
3.	analyse and evaluate intercultural factors	An
4.	understand grammar and apply the acquired grammatical knowledge in solving grammar exercises	Un, Ap
5.	differentiate the French culture	An
6.	understand the French and francophonic lifestyle	Un, Re

SEMESTER – I			
Course Title : PART – I French Paper – I Introductory French Course			
Course Code :21ULFA11	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Unit 1 – Bienvenue !

1.1- Une introductionà la langue française
1.2 – Les Salutations
1.3 – Les pronoms
1.4 – Les couleurs
1.5 – Dans la classe

Unit 2 – Et vous ?

2.1 – Se présenter, demander de se présenter
2.2 – Donner des informations personnelles
2.3 – Demander et donner des coordonnes
2.4 –Artistes francophone
2.5 – Réaliser une fiche d'identité

Unit 3 – On va où ?

3.1 – Demander / Indiquer un chemin
3.2 – Comprendre un itinéraire
3.3 – Se déplacer en métro ou en bus
3.4 – Paris / Montréal : deux villes à découvrir
3.5 – Réaliser un questionnaire sur la vie dans un quartier

Unit 4 – Qu'est-ce qu'on mange ?

4.1 – Comprendre / Donner des horaires
4.2 – Faire des courses / Commander au restaurant
4.3 – Exprimer ses gouts
4.4 – Québec / France : qu'est-ce que vous mangez ?
4.5 – Créer la carte d'un bar a jus

Unit 5 – Les soldes, c'est parti !

5.1 – Situer un moment dans une année
5.2 – Parler du métro
5.3 – Demander / dire la taille et la pointure
5.4 – Décrire un objet, dire à quoi ça sert
5.5 – Demander / Dire un prix

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz.*Edito A1Méthode de français*. Paris : Didier, 2016.

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercises*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet & J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahierd'exercices*. Paris : Didier, 2015
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com

SEMESTER-I			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English-I**		
Course Code 21UGEN11	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Objectives:

- To provide adequate exposure and opportunities for students to imbibe, develop, practise and use LSRW skills
- To help students read and comprehend contents in English

Course Outcome:

CO. No.	**Upon completion of this course, students will be able to**	PSO Addressed	**Cognitive Level**
CO- 1	understand and extend their listening and writing skills.	1	Un
CO- 2	apply and incorporate basic grammar and mechanics in writing.	3	Ap
CO- 3	understand literary texts in its socio-cutural contexts	2, 4	Un, Ap
CO- 4	communicate in English with confidence for employability.	3	Ap
CO- 5	appreciate and imbibe ethical and moral values through the study of the literary pieces.	5	Ap, Ev
CO- 6	construct simple sentences and short paragraphs in response to reading and writing.	8	Cr

SEMESTER-I			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English –I**		
Course Code 21UGEN11	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Unit I –Poetry

Rabindranath Tagore – Leave This Chanting

W.W. Gibson – The Stone

Ted Hughes – Hawk Roosting

Unit II – Prose

Stephen Leacock – My Lost Dollar

J.B. Priestley – On Doing Nothing

Robin Sharma – Your Commitment to Self- Mastery: Kaizen

Unit III – Short Story

Oscar Wilde – The Model Millionaire

Leo Tolstoy – Three Questions

K.A. Abbas – The Refugee

Unit IV – Grammar

Parts of Speech – Noun, Pronoun, Article, Adjective, Verb - Modals and Auxiliaries – Types of Sentences - Subject -Verb Agreement

Unit V- Communication Skills

Vocabulary, Listening Comprehension – Speaking – Reading, Filling Forms

(TANSCHE – Module I)

Text Books:

Units I-III – To be compiled by the Research Department of English

Unit IV- Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006. Print.

Unit – V – CLIL (Content & Language Integrated Learning) – Module I by TANSCHE (Tamil Nadu State Council for Higher Education)

SEMESTER- I			
Core I	**Mechanics and Properties of Matter**		
Course Code : 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Objectives:

1. To learn about mechanics and properties of matter
2. To know their relevance in day to day applications.
3. To learn about conservation laws, collisions and gravitational force, elasticity, surface tension and viscous nature of matter.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss the principle of conservation of energy and linear momentum (K2)	1	Un
CO-2	calculate the change in momentum of an object for the net force acting on the object (K3)	1	Ap
CO-3	analyse the motion of the projectile (K4)	1	An
CO-4	outline the fundamental concepts of stress and strain (K4)	1	An
CO-5	prove the relation connecting the three modulo of elasticity (K5)	1	Ev
CO-6	recall viscosity, coefficient of viscosity and surface tension (K1)	1	Re

SEMESTER- I			
Core I	**Mechanics and Properties of Matter**		
Course Code : 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Unit I: Conservation laws

Newton's laws of Motion- inertial frames – gravitational mass – conservation of linear momentum, conservation of angular momentum –conservation of energy – work energy theorem – conservative force and potential energy – centre of mass of a system of particles – two body problem and reduced mass – moment of inertia of system of diatomic molecules.

Unit II: Collision and Projectiles

Collision – impulse and linear momentum – elastic and inelastic collision – fundamental principles of impact – direct and indirect impact – velocities and kinetic energy in direct impact – loss of k. e in an indirect impact – transfer of energy in collision between two equal masses – projectile – expression for time of flight and horizontal range of a projectile – path of a projectile – range of a projectile on an inclined plane.

Unit III: Gravitation

Gravitation – Newton's law of gravitation – determination of gravitational constant – Boys' method – gravitational potential and field due to a spherical shell and solid sphere – acceleration due to gravity(g) by compound pendulum – variation of 'g' with altitude and latitude.

Unit IV: Elasticity and bending of beams

Stress – strain – Hooke's law –relation connecting elastic moduli – Poisson's ratio – twisting couple on a cylindrical wire (torsion) – expression for couple per unit twist – work done in twisting – torsion pendulum – theory – determination of rigidity modulus by dynamic method – bending of beams – expression for bending moment – uniform and non-uniform bending – theory and experiment – determination of young's modulus – work done in bending – cantilever – expression for depression at the loaded end of a cantilever.

Unit V: Viscosity and Surface Tension

Streamlined motion – turbulent motion – coefficient of viscosity – rate of flow of liquid in a capillary tube by dimension method and Poiseuille's formula – analogy between liquid flow and current flow – experimental determination of viscosity of a liquid by Stoke's method.

Surface tension – work done in increasing area of the surface – work done in blowing a bubble – variation of surface tension with temperature – experimental determination of surface tension by Jaegar's method – excess of pressure inside a curved liquid surface – excess pressure inside a liquid drop – excess pressure inside a soap bubble.

Text Books:

1. Murugeshan R. *Properties of matter*. S. Chand & Company Ltd. Revised edition 2008.
2. Ubald Raj A. and Jose Robin G. *Mechanics and Thermal Physics*. Marthandam: Indira publication 2003.
3. Ubald Raj A. and Jose Robin G. *Mechanics and relativity*. Marthandam: Indira Publications. 2008.

Books for Reference:

1. Mathur D. S. *Mechanics*. S. Chand & Co. Ltd. 1984.
2. Mathur D. S. *Properties of matter*. Ram Nagar: Shyamlal Charitable trust. 1992.
3. Brijlal and Subramanyam N. *Mechanics*. Himalaya Publishing House. ISO 9001:2015 certified.
4. Dr. Upadhyaya J.C. *Classical Mechanics*. Himalaya Publishing House. ISO 9001:2015 certified.

SEMESTER I			
Part III Allied – I	**Allied Biochemistry -I**		
Course Code: 21UCBA11	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

OBJECTIVES:

- To acquire knowledge about the chemical composition of life.
- To Understand fundamental biochemical processes.
- To knowledge about vitamins and their deficiency.
- To study the functions of hormones.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	express chemical composition and the elements of life.	1,2	Un
CO 2	evaluate the importance of bioenergetics.	1	Ev
CO 3	demonstrate about the various energy rich compounds such as adenosine triphosphate, guanosine triphosphate, uridine triphosphate, cytidine triphosphate and acyl phosphate.	6	Ap
CO 4	distinguish water soluble and fat-soluble vitamins and analyze their composition, functions and deficiency symptoms.	2	An
CO 5	generate the knowledge on hormones producing organs and their functions and to know about the plant as well as animal hormones.	5	Cr ,Re
CO 6	evaluate the antibiotics role in affecting cell wall synthesis, cytoplasmic membrane and enzyme systems.	2,7	Ev

SEMESTER I			
Part III Allied – I	**Allied Biochemistry -I**		
Course Code: 21UCBA11	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

UNIT I: Introduction to Biochemistry

Introduction to biochemistry - scope – chemical composition of life – elements of life – water – biological importance – Energy requirements of the body – Measurement of energy value of foods – Determination of energy requirement of man – Direct method, Indirect method, Respiratory quotients (RQ) of food stuffs – Total heat production – Significance of RQ Basal metabolism – Definition – Conditions for measurement – Factors influencing, Measurement, Significance, Specific dynamic action.

UNIT II : Bioenergetics

Introduction – Importance of bioenergetics - Energy and work – thermodynamic principles - Biological reactions – Exergonic reaction – Endergonic reaction – Energy and its forms - Energy rich compounds – Adenosine triphosphate – Guanosine triphosphate – Uridine triphosphate – Cytidine triphosphate – Acyl phosphate - Energy coupling.

UNIT III : VITAMINS

Introduction – definition - Sources of vitamin – Deficiency diseases – provitamins – biological functions - Properties of Vitamins – Classification of vitamins - water soluble (Vitamin B_1, B_2, B_3, B_5, B_6, B_7, B_9 and B_{12}Vitamin C) and fat soluble vitamins (Vitamin – A, D, E and K) and their composition, functions and deficiency symptoms.

UNIT IV :Hormones

Introduction –Definition – Properties – Biological Functions – Chemical Nature – Hormones secreting glands – Hormones producing organs and their functions - Classification of hormones: based on chemical nature – Functions of Hormones – Plant hormones(Auxins, Gibberllins, Cytokinins, Ethylene, Traumatic acid, Absicisic acid, Morphactins) – Animal hormones (STH, TSH, FSH, LH, LTH, Insulin)

UNIT V : Antibiotics

Introduction – Definition – Antibiotics affecting cell wall synthesis (pencillin, cephalosporin) – Antibiotics affecting the cytoplasmic membrane – Antibiotics interfering with Nucleic acid function – Antibiotics inhibiting protein synthesis (streptomycin, erythromycin, neomycin)– Antibiotics affecting enzyme systems – Drug resistance.

Text Books:

1. Dulsy Fatima, Narayanan L.M, MeyyanPillai R.P, Nallasingam K, Prasanna Kumar S and Arumugam N. *Biochemistry*.Saras Publications, 2010.
2. Patricia trueman.*Nutritional Biochemistry*. MJP publisher, 2011.
3. Veerakumari L. *Biochemistry*. MJP Publishers, 2010.

Books for Reference:

1. Dr. Deb A.C. Concepts of *Biochemistry.*Kolkatta:New Central Book Agency, 2001.
2. Powar C.B, Chatwal G.R, *Biochemistry.* Himalaya Publishing Ltd, 2002.

SEMESTER- I			
SEC I	**Professional English for Physics – I**		
Course Code: 21UPHPE1	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Objectives:

1. To gain knowledge regarding competence in speaking and reading correct English.
2. To know the importance of English in professional life.

COURSE OUTCOMES:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	draw flowcharts and mind maps (K1)	5	Re
CO-2	apply their own ability to improve their own competence in using the language (K3)	5	Ap
CO-3	criticise the use of language to speak with confidence (K5)	5	Ev
CO-4	discuss the importance of reading for life (K2)	5	Un
CO-5	write independently unfamiliar texts with comprehension (K1)	5	Re
CO-6	outline the importance of writing in academic life (K4)	5	An

SEMESTER- I			
SEC I	**Professional English For Physics – I**		
Course Code: 21UPHPE1	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

UNIT 1: COMMUNICATION **(6 hrs)**

Listening: Listening to audio text and answering questions - Listening to Instructions

Speaking: Pair work and small group work

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 2: DESCRIPTION **(6 hrs)**

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning- Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast Paragraph-Sentence Definition and Extended definition - Free Writing

Vocabulary: Register specific -Incorporated into the LSRW tasks.

UNIT 3: NEGOTIATION STRATEGIES **(6 hrs)**

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming (Mind mapping). Small group discussions (Subject -Specific)

Reading: Longer Reading text

Writing: Essay writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS **(6 hrs)**

Listening: Listening to lectures.

Speaking: Short talks

Reading: Reading Comprehension passages

Writing: Writing Recommendations Interpreting Visuals inputs

Vocabulary: Register specific -Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS **(6 hrs)**

Listening: Listening comprehension - Listening for information

Speaking: Making presentations (with PPT- practice)

Reading: Comprehension passages –Note making

Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

SEMESTER - I			
Ability Enhancement Course Value Education			
Code : 21UAVE11	**Hrs/Week : 2**	**Hrs / Semester: 30**	**Credits : 2**

Unit I: Introduction to Value Education

Concept of Values -Types of Values- Approaches to values - Benefits of Value Education- Characteristics of Values

Unit II: Human Values

Human Values -Sources of Human Values - Love -Compassion - Gratitude - Courage - Optimism - Forgiveness- the need and urgency to reinforce Human Values

Unit III: Social Values

Role of family and society in teaching values - Role of educational institutions in inculcating values-Three general functions of education for society-Self-Reflection- Our society's needs - Social Responsibilities of a student

Unit IV: Spiritual Values

Spiritual Values - Spiritual Development -Moral Development - Importance of Spiritual Values - Cultivation of Spiritual Values -Five most common spiritual values -Spiritual Resources

Unit V: Values for Life Enrichment

Goal Setting - Building relationship - Friendship - Love relationship - Family relationship - Professional relationship Interpersonal Relationship -Essential Life Skills that Help in Students Future Development-Life Enrichment Skills Domain

Books for Reference:

1. Sneha M. & K. Pushpanadham Joshi. *Value Based Leadership in Education Perspective and Approaches*, Anmol Publications Pvt. Limited, 2002.
2. Venkataiah.N. *Value Education*, APH Publishing, 1998
3. Pramod KumarM.*A Handbook on Value Education*, Ramakrishna Mission Institute of Culture (RMIC) 2007
4. Jagdosh Chand.*Value Education*. Shipra Publication 2007
5. Indrani Majhi (Shit)Ganesh Das, *Value Education*, Laxmi Publication Pvt. Ltd., 2017
6. Arumugam, N. S. Mohana, Lr.Palkani, *Value Based Education*, Saras Publication 2014

SEMESTER - II			
Part -1 பொதுத்தமிழ் - தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு,உரைநடை, வாழ்க்கை வரலாறு)			
Course Code: 21ULTA21	**Hrs/Week:6**	**Hrs/ Semester : 90**	**Credits :3**

Objectives:

- வாழ்வியல் நன்னெறிகளான மனிதநேயம், சமத்துவம் போன்றவற்றை வளர்த்துக் கொள்ளக் கற்றுக் கொடுத்தல்
- அறநெறியைக் கடைப்பிடிப்பதே நிலையானதும் நீடித்ததுமான நன்மையைத் தருவது என்பதைச் சான்றோரின் வாழ்க்கை நெறிகள் மூலம் உணரச்செய்தல், மொழி அறிவு, இலக்கிய அறிவு இவற்றை வளர்த்துக் கொள்ளக் கற்றுக் கொடுத்தல்

Course Outcome

Co.No.	**இப்பாடத்திட்டம் மாணவியருக்கு**	**அறிவுசார் மதிப்பீடு**
CO-1	இறை ஆற்றலை உணர்ந்துகொள்ள உதவுகிறது	மதிப்பீடு
CO-2	நல்ல நண்பர்களையும் நல்ல மனிதர்களையம் இனம் கண்டுகொள்ளவும், அன்பு, இரக்கம், நற்சொல், நற்செயல் போன்ற நற்பண்புகளோடு வாழவும் வழி வகுக்கிறது.	நடைமுறைப்படுத்துதல்
CO-3	மனித நேய பண்புகளோடு வாழ்ந்த சான்றோரின் அனுபவங்களைப் பெற்றுக்கொள்ள உதவுகிறது	நடைமுறைப்படுத்துதல்
CO-4	தனிமனித வாழ்க்கைச் சிக்கல்களையும் பிரச்சனைகளையும் எதிர்கொள்ளும் ஆற்றலை உருவாக்குகிறது.	நடைமுறைப்படுத்துதல், திறன் மேம்பாடு
CO-5	இறைவன் முன் அனைவரும் சமம் என்ற சிந்தனையை உருவாக்குகிறது.	மதிப்பீடு
CO-6	போட்டித்தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல்

SEMESTER - II			
Part -1 பொதுத்தமிழ் - தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, வாழ்க்கை வரலாறு)			
Course Code: 21ULTA21	**Hrs/Week:6**	**Hrs/ Semester : 90**	**Credits :3**

அலகு - 1 செய்யுள் - 2 மணி

சமய இலக்கியங்கள்

இறைவணக்கம் - திருநாவுக்கரசர்

சைவம் 1. தேவாரம் - திருஞான சம்பந்தர், திருநாவுக்கரசர், சுந்தரர்
2. திருவாசகம் - மாணிக்கவாசகர்
3. திருமந்திரம் - திருமூலர்
4. திருப்புகழ் - அருணகிரி நாதர்

வைணவம்: 1. திருப்பாவை - ஆண்டாள்
2. திருவாய்மொழி- நம்மாழ்வார்

பௌத்தம்: மணிமேகலை - சீத்தலைச் சாத்தனார்

கிறித்தவம்: 1. தேம்பாவணி - வீரமாமுனிவர்

2. இயேசு காவியம் - கவிஞர் கண்ணதாசன்

இசுலாமியம்: பேட்டை ஆம்பூர் அப்துல் காதிர் சாகிபு பாடல் - சக்கறாத்து நாமா

நீதி இலக்கியங்கள்

1. திருக்குறள் - ஊக்கமுடைமை
2. நாலடியார் - 1. நன்னிலைக் கண்
   2. உறங்கும் துணையது
3. பழமொழி நானூறு- 1. பொல்லாத சொல்லி
   2. வருவாய் சிறிதெனினும்

அலகு - 2 இலக்கணம் - 1 மணி

1. சொல்லின் பொது இலக்கணம்
2. ஒரெழுத்து ஒருமொழி, சொல்லின் வகைகள்
3. பெயர்ச்சொல் - அறுவகைப் பெயர்கள்
4. வினைச்சொல் - வகைகள்- முற்று, எச்சம், ஏவல், வியங்கோள், செய்வினை, செயப்பாட்டுவினை, தன்வினை, பிறவினை
5. இடைச்சொல் - ஏகார, ஓகார, உம்மை இடைச்சொற்கள்
6. உரிச்சொல் - இலக்கணம், வகைகள்

மொழிப்பயிற்சி–ஒலி வேறுபாடு அறிதல்

அலகு - 3 இலக்கிய வரலாறு – 1 மணி

1. சைவ இலக்கியங்கள்
2. வைணவ இலக்கியங்கள்
3. கிறித்தவம் தமிழுக்குச் செய்த தொண்டு
4. இசுலாமியம் தமிழுக்குச் செய்த தொண்டு
5. பதினெண் கீழ்க்கணக்கு நூல்களில் 11 அறநூல்கள்

அலகு - 4 உரைநடை - 1 மணி

நிறைவான வாழ்க்கைக்கு நேரம் ஒதுக்குங்கள் - ஜே.மௌரஸ்

(10 முதல் 19 வரை உள்ள கட்டுரைகள்)

அலகு – 5 வாழ்க்கை வரலாறு - 1 மணி

மனிதமே புனிதம் - சுடர்ந்தெழு - முனைவர் அருட்சகோதரி ஆ.மரிய சாந்தி

SEMESTER – II			
Course Title : PART – I French Paper – II Intermediate French Course			
Course Code :21ULFA21	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Objectives

To develop and improve upon the acquisition of four competencies of language learning.

To motivate the learner through role plays as to create real life situations. To prepare her for the real communication challenges.

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	listen, understand and make basic conversation in French	Un, Ap
2.	demonstrate proficiency in vocabulary	Re, Ap
3.	be involved in simulation and role-play	Re, Ap
4.	analyse her culture and compare it with French Culture	Re, Un
5.	create passages on her own	Ap, Cr
6.	get a gist of the French literature	Un

SEMESTER – II			
Course Title : PART – I French Paper – II Intermediate French Course			
Course Code :21ULFA21	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Unit 1 – C'est quoi le programme ?

1.1 –Parler de ses activités quotidiennes
1.2 – Demander/ Dire l'heure
1.3 – Proposer/ fixer / accepter ou refuser un rendez-vous.
1.4 – Réserver par téléphone
1.5 – Créer un mini-article sur un loisir

Unit 2 – Félicitations !

2.1 – Comprendre un arbre généalogique
2.2 – Présenter sa famille
2.3 – Féliciter / adresser un souhait
2.4 – Décrire le physique et le caractère d'une personne
2.5 – Créer les personnages d'une famille pour un film

Unit 3 – Chez moi

3.1 – Comprendre un état des lieux simple
3.2 – Se renseigner sur un logement
3.3 – Comprendre un règlementintérieur d'immeuble
3.4 – Exprimer des règles de vie commune
3.5 – S'excuser dans un message

Unit 4 – Bonnes vacances

4.1 – Comprendre un site de réservation en ligne
4.2 – Exprimer la préférence / Hésiter
4.3 – Ecrire un mail formel / une carte postale
4.4 – Exprimer des sensations, une émotion positive, la surprise
4.5 – Ecrire une liste de voyage

Unit 5 – Le texte littéraire

5.1. Le Petit Prince (Chapitre 1) - Antoine de Saint Exupéry
5.2. La colombe poignardée et le jet d'eau – Calligramme - Guillaume Apollinaire

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1Méthode de français*. Paris : Didier, 2016.

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercises*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet&J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahier d'exercices*. Paris : Didier, 2015
- Apollinaire Guillaume, *Calligrammes :Poèmes de la paix et de la guerre 1913-1916*.Paris: Gallimard, 1966.
- Antoine de Saint-Exupéry.*Le Petit Prince*. Paris : Gallimard, 2007.
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com

SEMESTER-II			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English –II**		
Course Code 21UGEN21	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Objectives

- To help students realise how life, literature and language are closely connected
- To expose students to language skills through the core subjects

Course Outcome:

CO.No.	**Upon completion of this course, students will be able to**	PSO Addressed	**Cognitive Level**
CO-1	enhance their vocabulary through the texts.	1	Un
CO- 2	demonstrate effective communication skills.	3	Un, Ap
CO- 3	comprehend passages and interpret on their own.	1,2	Un, Ap
CO- 4	construct paragraphs and essays, make notes and sum up passages.	8	An
CO- 5	analyse literary pieces and inculcate ethical values.	5	An
CO- 6	evaluate how language and literature are closely related to life.	5,6	Cr

SEMESTER-II			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English–II**		
Course Code: 21UGEN21	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Unit I –Poetry

William Wordsworth – Resolution and Independence
Henry W. Longfellow – Psalm of Life
Toru Dutt – The Lotus

Unit II – Prose

A.G. Gardiner – On Courage
Desmond Morris – A Little Bit of What You Fancy
Kalpana Chawla – The Sky is the Limit

Unit III – Short Story

Saki – Mrs. Packletide's Tiger
Liam O'Flaherty – The Sniper
Langston Hughes – Thank You Ma'am

Unit IV – Grammar

Tenses: Present, Past and Future

Unit V- Communication Skills

Listening, Reading, Pronunciation, Key Functions, Speaking (TANSCHE - Module - II)

Text Books:

Units I-III – To be compiled by the Research Department of English

Unit – IV - Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006.

Unit - V – CLIL (Content & Language Integrated Learning) – Module II by TANSCHE (Tamil Nadu State Council for Higher Education)

SEMESTER- II			
CORE II	**Thermal Physics and Optics**		
Course Code: 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Objective:

1. To gain knowledge about the laws of thermodynamics
2. To understand the concept of transport phenomena and thermal conductivity
3. To provide a solid understanding of low temperature physics and optical phenomena
4. To know the spectacular nature of light by studying interference, diffraction and polarisation

COURSE OUTCOMES:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recall the laws of thermodynamics to understand the concepts of transport phenomenon (K1)	1	Un
CO-2	discuss the transfer of energy through conduction, convection and radiation (K2)	1	Re
CO-3	demonstrate and determine the thermal conductivity of a bad conductor (K3)	1	Ap
CO-4	categorize the different types of aberrations in lenses (K4)	1	An
CO-5	evaluate the thickness of a thin wire by forming interference fringes (K5)	1	Ev
CO-6	summarise the knowledge on polarisation of light and its changes upon reflection and transmission (K2)	1	Un

SEMESTER- II			
CORE II	**Thermal Physics and Optics**		
Course Code: 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Unit I: Laws of thermodynamics and Transport Phenomena

Zeroth law of thermodynamics – first law of thermodynamics – isothermal change – adiabatic change – heat engine – expression for the efficiency of a Carnot's engine – Carnot's cycle as refrigerator – reversible and irreversible process – second law of thermodynamics — entropy – change in entropy in reversible and irreversible process – temperature-entropy diagram – third law of thermodynamics – mean free path - transport phenomena - expression for the viscosity of a gas – expression for thermal conductivity of a gases – expression for the coefficient of diffusion

Unit II: Transfer of heat and low temperature physics

Conduction, convection and radiation – conduction of heat – Lee's Disc's method of determining K of a bad conductor – convection of heat – Newton's law of cooling by convection –experimental verification of Newton's law of cooling –the Joule Porous plug experiment – relation between inversion, Boyle and critical temperatures – adiabatic demagnetization – theory and experimental setup.

Unit III: Dispersion and Aberrations

Dispersion through a prism – angular dispersion – dispersive power – achromatism in prisms – deviation without dispersion – dispersion without deviation – direct vision spectroscope – constant deviation prism – constant deviation spectroscope – spherical aberration in lenses – methods of minimizing spherical aberration – condition for minimum spherical aberration of two thin lenses separated by a distance – aplanatic lens – chromatic aberration in lenses – condition for achromatism of two thin lenses in contact – coma.

Unit IV: Interference and Diffraction

Interference – conditions for sustained interference – interference by reflected systems – production of colours in thin films– air wedge – determination of diameter of a thin wire by air wedge – test for optical flatness – Newton's rings – determination of wavelength of sodium light by Newton's rings – determination of refractive index of a liquid by Newton's rings.

Fresnel's diffraction – half period zones – zone plate – multiple foci in a zone plate – comparison of zone plate with a convex lens – Fraunhofer diffraction – plane transmission diffraction grating – grating at normal incidence –determination of wavelength of light by normal incidence method and minimum deviation method– dispersive power of grating –grating at oblique incidence – resolving power of optical instruments – Rayleigh's criterion for resolution – resolving power of a grating.

Unit V: Polarisation

polarisation of light – double refraction – Nicol prism – polarizer and analyzer – quarter wave plate and half wave plate – plane, elliptically and circularly polarized light:production and detection – optical activity – Fresnel's theory of optical activity – experimental verification of Fresnel's theory – specific rotation – Laurent's half shade polarimeter.

Text Books:

1. Ubald Raj A. and Jose Robin G. *Mechanics and Thermal Physics*. Marthandam: Indira publication.
2. Murugeshan R. *Thermal Physics and Geometrical Optics*.
3. Murugeshan Kiruthiga Sivaprasath R. *Optics and Spectroscopy*. S. Chand & Company Ltd. Revised edition 2014.

Books for Reference:

1. Gupta B. and Roy H.P. *Thermal Physics*. Books and Allied (P) Ltd., Second edition 2005.
2. Brijlal and Subramanyam N. *Heat and thermodynamics*, S. Chand & Co. Ltd. 2005.
3. Arunabhasen and Gupta A. B. *College Physics.* volume I. Books and Allied (P) Ltd. 2005.
4. Brijlal and Subramanyam N. *Optics*. S. Chand & Co. Revised by M.N. Avadhanulu. 23rd revised edition 2006.

SEMESTER- II			
Core Practical			
Course Code : 21UPHPR1	**Hrs/Week: 2**	**Hrs/ Semester: 30**	**Credits : 2**

Any 14 experiments

1. Measurement of diameter using vernier caliper, screw gauge and travelling microscope.
2. Young's modulus – Uniform bending (pin and microscope)
3. Young's modulus – Non uniform bending (scale and telescope)
4. Young's modulus – Cantilever depression (pin and microscope)
5. Coefficient of viscosity – Stoke's method
6. Compound pendulum – 'g' and 'k'
7. Spectrometer – Determination of μ
8. Air wedge – Thickness of a wire
9. Lee's Disc – Thermal Conductivity of a bad conductor
10. Melde's String
11. Long focus convex lens – determination of focal length, R and μ
12. Rigidity modulus – Torsion pendulum
13. Spectrometer – Determination of dispersive power
14. Sonometer - A.C frequency
15. Newton's law of cooling - Specific heat capacity of liquid
16. Coefficient of viscosity- Burette method
17. Surface Tension – Capillary rise method
18. Newton's ring
19. Surface Tension – Drop weight method
20. Comparison of viscosities – Oswald's viscometer/ Hare's apparatus

SEMESTER II			
Part III Allied - I	**Allied Biochemistry –II**		
Course Code: 21UCBA21	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

OBJECTIVES:

- To achieve broad based knowledge in concepts and principles of biochemistry.
- To provide an opportunity in acquiring knowledge about nutritional biochemistry.
- To understand the various pathways involved in cell respiration.
- To grasp in-depth knowledge about the biochemistry of blood and respiration.
- To familiarize the learners with the techniques involved in biochemistry.

Course Outcomes

CO No.	**Upon completion of this course, students will be able to**	**PSOs addressed**	**CL**
CO 1	discuss in detail about the nutritional values of milk, egg, meat, fish, vegetable foods, fruits, tea, coffee, cocoa and alcohol.	1	Un
CO 2	demonstrate the theories of biological oxidation decarboxylation, electron transport system and oxidative phosphorylation.	5	Ap
CO 3	describe the functions of blood and to discuss in brief about red blood cells, white blood cells, blood platelets, plasma and plasma protein.	6	Re
CO 4	evaluate how the minerals are important in our life interpret the various minerals and their recommended levels in food.	1	Ev
CO 5	analyse the relation between optical and electron microscope.	2	An
CO 6	develop the knowledge on instrumentation technique and to generate the real applications.	2	Cr

SEMESTER II			
Part III Allied - I	**Allied Biochemistry –II**		
Course Code: 21UCBA21	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

UNIT I: Nutritional Biochemistry

Nutritive value ofMilk – Egg – Meat - Fish – Vegetable food (Cereals, Pulses, Nuts, Roots and Tubers, Green leafy vegetables) – Fruits – Tea – Coffee – Cocoa – Alcohol – Principles in balancing a diet - Bioavailability – absorption –effect of drugs on food intake, body weight, nutrient requirements and growth, vitamins and minerals – Energy yielding, Body building and Protective foods.

UNIT II: Cell Respiration and Biological Oxidation

Introduction – Importance of Biological oxidation – Theories of biological oxidation : oxygen activation theory, hydrogen activation theory – Hydrogen acceptors – Nicotinamide nucleotide – Flavin nucleotide – Cytochrome – Sites – Pathways – Oxidative decarboxylation – Electron transport system – Oxidative Phosphorylation – Energetics of Biological oxidation.

UNIT III: Biochemistry of Blood

Introduction –Composition -Colour of Blood - Functions of Blood – (Homeostatic functions, Blood as transport system)- Red Blood Cells – White Blood Cells– Blood Platelets – Plasma – Plasma proteins – Albumin, Globulin (alpha, beta and gamma), Fibrinogen – Functions of plasma proteins - Blood groups – Prevention of Blood Loss -Hemoglobin – Variation in structure Hemoglobin with reduced solubility, altered oxygen affinity.

UNIT IV: Minerals

Introduction – Classification (Macro elements, Micro elements) –Functions, Distribution, Content level in blood , sources, Recommended Dietary allowances, Absorption and excretion, Factors affecting absorption, Deficiency Disease of Calcium, Phosphorous, Sodium, Potassium, Iron, Copper, Iodine, Fluorine, Zinc and Chromium.

UNIT V: Biochemical Techniques

Introduction –Cell Fractionation (Homogenization, Centrifugation) - Centrifuge – Principle, types – Hand Centrifuge, High Speed Centrifuge – pH meter – Principle, Electrodes used, Applications – Microscopy: Optical and electron Microscope – comparison – Ion probe analysis – Electrophoresis – Paper electrophoresis, Gel electrophoresis –Applications.

Text Books:

1. Dulsy Fatima, Narayanan L.M, MeyyanPillai R.P, Nallasingam K, Prasanna Kumar S and Arumugam N. *Biochemistry*. Saras Publications, 2010.
2. Patricia trueman.*NutritionalBiochemistry*. MJP publisher, 2011.
3. Veerakumari L. *Biochemistry*. MJP Publishers, 2010.

Reference Books:

1. Dr. Deb A.C.*Concepts of Biochemistry*.Kolkata: Central Book of Agency, 2001.
2. Powar C.B, Chatwal G. R. *Biochemistry*. Himalaya Publishing Ltd, 2002.

SEMESTER I & II			
Allie Practical – I	**Allied Biochemistry Practical**		
Course Code:21UCBAR1	**Hrs/Week : 2**	**Hrs/ Sem : 30**	**Credits : 1**

OBJECTIVE:

- To train the students to get a clear idea on qualitative analysis of biomolecule.
- To understand the volumetric analysis estimation of biomolecule.
- To know the basic concepts of saponification number and pH metre.

Qualitative and Quantitative Analysis

Analysis of Simple Biomolecule

I. Qualitative analysis of carbohydrates.

II. Qualitative analysis of amino acids.

III. Colour reactions of Proteins.

Volumetric Analysis

I. Estimation of Glycine by formal titration.
II. Estimation of Ascorbic acid.
III. Estimation of Protein by Biuret method.
IV. Determination of Saponification number of oil.
V. Estimation of Carbohydrate by anthrone method.
VI. Preparation of Buffer and Determination of its pH using pH meter.

BOOKS FOR REFERENCE:

1. Arthur D. Vogel.*Vogel's Textbook of Quantitative Chemical Analysis*.sixth Edition. 2004.
2. RaghupatiMukhopadhyay, PratulChatterjee. *Advanced Practical Chemistry*. Books and Allied (P) Ltd., Third Edition.2007.

SEMESTER- II			
SEC II	**Professional English for Physics – II**		
Course Code: 21UPHPE2	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Objective

1. To gain knowledge regarding communication skills.

2. To organise and write proposals for conducting seminars and workshops.

COURSE OUTCOMES:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss in small groups based on the listening and reading passages (K2)	5	Un
CO-2	identify the articles, prepositions and pronouns in the given passages (K1)	5	Re
CO-3	apply the acquired vocabulary knowledge in their writing skills (K3)	5	Ap
CO-4	simplify the given comprehension (K4)	5	An
CO-5	argue on digital competence for academic and professional life (K5)	5	Ev
CO-6	write slogans and captions (K1)	5	Re

SEMESTER- II			
SEC II	**Professional English for Physics – II**		
Course Code: 21UPHPE2	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

UNIT 1: Communicative Competence (6 hrs)

1. Listening – Listening to talks/lectures by eminent scientist on Physics related topics - (TED Talks) and answering comprehension exercises based on the talks
2. Speaking: Small group discussions (the discussions is based on the listening and reading Passages - open ended questions)
3. Reading: One Physics based reading texts followed by comprehension activities/exercises
4. Writing: Summary writing based on the reading passages.

UNIT 2: Persuasive Communication (6 hrs)

1. Listening: listening to a product launch- sensitizing learners to the nuances of persuasive communication
2. Speaking: Debates – Just a minute activities
3. Reading: reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions.
4. Writing: dialogue writing- writing an argumentative /persuasive essay.

UNIT 3: Digital Competence (6 hrs)

1. Listening to interviews.
2. Speaking: Interviews with subject specialists (using video conferencing skills)
3. Reading: Selected sample of Web Page
4. Writing: Functioning of a computer
5. Reading: Comprehension: Essay on Digital Competence for Academic and Professional Life.

   The essay will address some aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area.

UNIT 4: Creativity and Imagination (6 hrs)

1. Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites – Eg.https://www.youtube.com/watch?v=8Krok63LbW8
   (Video showcasing the importance of study of Astrophysics)
2. Speaking: Making oral presentations through short films – Physics based
3. Reading: Essay on Creativity and Imagination - Physics based
4. Writing: Poster making – Writing slogans/Captions – Physics based

UNIT 5: Workplace Communication and Basics of Academic Writing (6hrs)

1. Speaking: Short presentation using PowerPoint
2. Reading: Writing: Flyers.
3. Writing: An introduction, paraphrasing.
4. Punctuation (period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks)

Semester – II			
Environmental Studies			
Code : 21UAEV21	**Hrs/ Week : 2**	**Hrs/Sem:30**	**Credits : 2**

Course Outcomes:

Upon completion of this course, the students will be able to

1 Recognize the biotic and abiotic components of ecosystem and how they function.
2 Use natural resources more efficiently and know more sustainable ways of living.
3. Acquire an attitude of concern for the environment.
4. Participate in improvement and protection of environment.
5. Manage unpredictable disasters.
6 Create awareness about environmental issues to the public.

Unit I Environment and Ecosystem

Aim and need for Environmental Awareness - Components of Environment Ecosystem - Components of Ecosystem: Abiotic and biotic factors (Producer, Consumer and Decomposer) – Food Chain, Tropic Levels - Food Web, Energy flow and Ecological pyramids

Unit II Natural Resources:

Renewable and non-renewable resources – Water Resources: Uses and Conservation of Water – Rain Water Harvesting – Forest Resources: Importance of Forests - Major and Minor forest produces - Conservation of Forest Energy Resources: Solar Fossil Fuel – Wind – Role of individuals in the conservation of natural resources

Unit III Environmental Pollution

Pollutants – Types of pollution: Air, Water, Noise and Plastic Pollution – Causes, effects and Control measures – Global warming and Climate Change

Unit IV **Human Population and Environment**

Effect of human population on environment – Population Explosion problems related to population explosion – Involvement of population in conservation of environment – Measures adopted by the Government to control population growth – Environment and human health

Unit V **Disaster Management**

Floods–Drought–Earthquakes– Cyclones – Landslide–Tsunami–Control measures

SEMESTER – III			
Part-I பொதுத்தமிழ் - தாள் 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்,)			
Course Code: 21ULTA31	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

- மாணவியர் இறை நம்பிக்கையிலும், நற்பண்புகளிலும் வளர்ந்து, இலக்கிய அறிவிலும் மொழித்திறனிலும் சிறந்து விளங்க வழிகாட்டல்.
- காப்பிய மாந்தரின் வாழ்க்கையின் மூலமாக கடவுள் நம்பிக்கை, நல்ல உறவுகள், இயற்கையை நேசித்தல், மொழிஅறிவு போன்றவற்றை வளரச் செய்தல்.

Course Outcome:

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	பெண்களின் சட்டங்கள் உரிமைகள், வேலைவாய்ப்பு பற்றிய விபரங்களை அறிந்து கொள்ள உதவுகிறது.	நடைமுறைப்படுத்தல்
CO-2	அரசியல் சூழ்ச்சி, இனம், சாதி குறித்த பாகுபாடு இவற்றிலிருந்து விடுதலை பெறும் வழிவகைகளைக் கற்றுக்கொடுக்கிறது.	நடைமுறைப்படுத்தல்
CO-3	இலக்கிய அறிவினை வளர்க்க, காப்பியச் சுவை உணர்ந்து சுவைக்க வாய்ப்பளிக்கிறது.	நடைமுறைப்படுத்தல்
CO-4	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை உருவாக்குகிறது	நடைமுறைப்படுத்தல்
CO-5	இப்பகுதியில் வாழும் அடித்தட்டு மக்களின் வாழ்வு நிலையை அறிந்து கொள்ள உதவுகிறது. பெண்கள் நீதிக்குப் போராடும் உணர்வை வளர்க்கிறது.	நடைமுறைப்படுத்தல், திறன் மேம்பாடு
CO-6	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல்,திறன் மேம்பாடு

SEMESTER – III			
Part-I பொதுத்தமிழ் - தாள் 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்,)			
Course Code: 21ULTA31	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

அலகு - 1 செய்யுள் - 2 மணி

காப்பியங்கள்

1. சிலப்பதிகாரம் - அடைக்கலக் காதை : 11 – 94 பாடலடிகள்
2. மணிமேகலை – ஆபுத்திரன் திறன் அறிவித்த காதை : 1 முதல் 56 பாடலடிகள்
3. பெரியபுராணம் - கண்ணப்ப நாயனார் புராணம். (பாடல்கள்: 757 - 762, 67, 74, 81, 84,85, 804, 05, 06, 12, 14, 18, 19, 825 – 832, 834.
4. கம்பராமாயணம் - நட்புக்கோட் படலம்.
5. சீறாப்புராணம் - கள்வரை நதி மறித்த படலம்.
6. தேம்பாவணி - வளன் சனித்த படலம்.- 9 முதல் 31 பாடல்கள்.

சிற்றிலக்கியம்

1. திருக்குற்றாலக் குறவஞ்சி. IV குறவஞ்சி நாடகம். 8. எங்கள் மலையே.

அலகு -2 இலக்கணம் - 1 மணி

பொருள் இலக்கணம்

1. அகப்பொருள் : எழுதிணை விளக்கம் - முதல், கரு, உரிப்பொருள்
2. புறப்பொருள் : வெட்சித்திணை முதல் பாடாண்திணை வரை விளக்கம் மட்டும்

யாப்பு இலக்கணம்

1. யாப்பு உறுப்புகள். (எழுத்து, அசை, சீர், தளை, அடி, தொடை)

அலகு - 3 இலக்கிய வரலாறு - 1 மணி

1. ஐம்பெருங்காப்பிங்கள்
2. ஐஞ்சிறுகாப்பியங்கள்
3. சிற்றிலக்கியத்தின் தோற்றமும் வளர்ச்சியும், பிள்ளைத்தமிழ், கலம்பகம், குறவஞ்சி, பரணி.
4. புதினம் தோற்றமும் வளர்ச்சியும்..

அலகு - 4 உரைநடை - 1மணி

இப்பொழுது இவள் - ப. திருமலை.

அலகு - 5 புதினம் - 1 மணி

தேரியாயணம் (சமூக நாவல்) - கண்ணகுமார விஸ்வரூபன்.

SEMESTER – III			
Course Title : PART – I French Paper – III Advanced French Language			
Course Code : 21ULFA31	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Objectives

To enhance the acquisition of all the four competencies of language learning.

To create the independent capability of the learner to respond and tackle the various situations of communication when the learner is in the native country of the target language

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	analyse and Interpret French realities	An, Ap
2.	understand and analyse the various components of French life	Un, An
3.	evaluate French civilisation , appreciate the differences between eastern and western civilisation	Ev
4.	understand grammar and apply the acquired grammatical knowledge to do the grammar exercises	Un, Ap
5.	create passages on her own civilisation in the target language	Un, Cr
6.	comprehend French literature	Un

SEMESTER – III			
Course Title : PART – I French Paper – III Advanced French Language			
Course Code : 21ULFA31	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Unit 1 – Pas de chance !

1.1 –Se plaindre / plaindre quelqu'un
1.2 – Donner une explication
1.3 – Exprimer une émotion négative
1.4 – Demander et dire le poids et la taille
1.5 – Chance et malchance

Unit 2 – Beau travail ?

2.1 – Comprendre un programme d'échange universitaire
2.2 – Exprimer le but, le souhait et un projet professionnel
2.3 – Exprimer une capacite, une compétence
2.4 – Comprendre des taches professionnelles
2.5 – Universités 2.0

Unit 3 – Au grand air

3.1 – Comprendre une BD sur un changement de vie
3.2 – Exprimer son insatisfaction
3.3 – Exprimer un choix de vie
3.4 – Décrire son mode de vie
3.5 – Je cultive mon jardin

Unit 4 – C'était bien ?

4.1 – Parler de ses difficultés
4.2 – Encourager, rassurer
4.3 – Parler d'un projet
4.4 – Exprimer son accord, son désaccord et intérêt
4.5 – Les Français en chanson

Unit 5 – Le texte littéraire

5.1 – Demain dès l'aube - Victor Hugo
5.2 – La Laitière Et Le Pot Au Lait - Jean De La Fontaine

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1Méthode de français*. Paris : Didier, 2016.
Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercises*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet&J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I.* Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahier d'exercices*. Paris : Didier, 2015
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com
- https://www.frenchtoday.com/french-poetry-reading/

SEMESTER – III			
Part II English Poetry, Prose, Extensive Reading and Communicative English - III			
Course Code: 21UGEN31	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- To acquaint students with literary art and writings of universal appeal.
- To strengthen the proficiency of communicative English through literary based study.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	understand the language and literary components of texts	1	Un
CO-2	develop interest and appreciate literary texts	2	Un, Ev
CO-3	comprehend aspects of grammar and its application	6	Un
CO-4	evaluate perspectives and human values for life	4, 5	Ev
CO-5	adopt appropriate technique to enhance communication and writing	3, 7	Ap, Cr
CO-6	enrich vocabulary and develop skills of formal writing and communication	7, 8	Ap, Cr

SEMESTER – III			
Part II General English Poetry, Prose, Extensive Reading and Communicative English - III			
Course Code: 21UGEN31	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Unit I –Poetry

William Shakespeare – All the World's a Stage

Dylan Thomas – Do not go gentle into that good night

Sri Aurobindo Ghosh – The Divine Worker

Unit II – Prose

Bertrand Russell – How to Avoid Foolish Opinions

Virginia Woolf – Men and Women

M.K. Gandhi – At School

Unit III – Fiction

Charlotte Bronte -*Jane Eyre* (Abridged Version)

Unit IV – Grammar

Active and Passive Voice, Direct and Indirect Speech

Unit V –Communication Skills

Listening Comprehension, Close Reading, Conversational English, Formal Writing

Text Books:

Units I – III – Compiled by the Research Department of English.

Units IV – Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay

Nicole Imprints Private Limited, 2006.

Unit V – CLIL (Content & Language Integrated Learning) – Module IV by TANSCHE.

SEMESTER III			
Core III	**Electricity and Electromagnetism**		
Course Code: 21UPHC31	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits : 4**

Objectives:

1. To deal with the basic concept of electricity
2. To discuss the laws of electromagnetic induction
3. To extend the fundamental concepts to AC bridges

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	recall Current, Ohm's law and Kirchoff's law (K1)	1	Re
CO–2	apply Kirchoff's law to Wheatstone's network (K3)	1,6	Ap
CO–3	apply the principle of potentiometer to measure current and resistance (K3)	1,6	Ap
CO–4	compare self inductance and mutual inductance (K4)	1,6	An
CO–5	compare LCR series and parallel resonance circuit (K2)	1,6	Un
CO–6	evaluate the value of capacitance using Desauty's bridge (K5)	1,6	Ev

SEMESTER III			
Core III	**Electricity and Electromagnetism**		
Course Code: 21UPHC31	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits : 4**

Unit I: Steady Currents and Thermo-Electricity

Current and Current density – Expression for current density –Equation of Continuity – Ohm's law and Electrical Conductivity – Kirchoff's laws – Applications to Wheatstone's network – Carey Foster bridge – Determination of the Temperature coefficient of resistance – Potentiometer: Principle, Calibration of Ammeter, Voltmeter (Low & High range), Measurement of Resistance of a coil with a Potentiometer – Seebeck effect – Law of Thermo emf – Peltier effect – Thomson effect – Thermodynamics of Thermocouple.

Unit II: Magnetic Properties and Magnetostatics

Magnetic induction (B) – Magnetization (M) – Relation between B, H and M – Magnetic susceptibility – Magnetic permeability – Relation connecting them.

Moving coil Ballistic galvanometer: Principle, Construction, Theory – Correction for damping – Measurement of Charge sensitiveness – Absolute capacitance of a capacitor.

Unit III: Electromagnetic Induction

Faraday's laws of induction – Lenz law – Expression for induced current – Self induction – Self inductance of a long solenoid – Determination of self inductance by Rayleigh's method – Self inductance of a toroidal coil of rectangular and circular cross- section – Mutual induction – The Neumann formula for mutual inductance – Mutual inductance between two coaxial solenoids – Experimental determination of mutual inductance- Eddy currents.

Unit IV: Alternating Current

Emf induced in a coil rotating in a magnetic field – A.C circuit containing Resistance, Inductance and Capacitance only – A.C circuit containing L and R in series – A.C circuit containing C and R in series – A.C circuit containing LCR in series – Parallel resonance circuit

– Power in A.C circuit – Choke coil.

Unit V: Transformers and A.C Bridges

Coupled circuit – Transformers – Detailed theory of transformer – Transformer losses

–A.C bridges – A.C bridges for the measurement of inductances: Maxwell's bridge, Owen bridge, Anderson's bridge – A.C bridges for the measurement of capacitance: De Sauty's bridge, Wein's bridge,

Schering bridge – Robinson's bridge for determining the frequency of an a.c source.

Text Books:

1. Murugeshan R. *Electricity and Magnetism*. New Delhi: S. Chand & company Ltd.Reprint, 2019.
2. Dr.Tewari K.K. *Electricity and Magnetism with Electronics.* New Delhi: S. Chand & company Ltd. Reprint, 2018.

Books for Reference:

1. Brijlal and Subramanium. *Electricity and Magnetism*. Ratan Prakash mandir. 7th edition 1994.
2. Tayal D.C. *Electricity and Magnetism*. Himalaya Publishing House. 3rd revised edition 1998.
3. David Halliday, Robert Resnick and Jearl Walker. *Fundamentals of Physics.* Wiley & Sons Inc. 6th edition 2006.

SEMESTER – III			
Part III	**Allied Mathematics – I**		
Code : 21UMAA31	**Hrs / Week: 6**	**Hrs / Semester: 90**	**Credits: 4**

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	POs addressed	CL
CO-1	the equations from the given roots&approximate solutions of equations by applying Horner's method and Newton's method	1	Un
CO-2	develop and apply concepts of expressions and equations to investigate and describe relationships	5	An
CO-3	evaluate eigen values and eigen vectors of square matrices and make use of the properties of determinants in their calculation.	3	Ev
CO-4	calculate the radius of curvature, centre and circle of curvature.	5	Ev
CO-5	compute the gradient of a scalar valued function ,curl,and divergence of vector fields	3	Cr
CO-6	interpret basic definitions and classify the differential equations with respect to their order and linearity	1	Un

Semester –III			
Part III	**Allied Mathematics – I**		
Code : 21UMAA31	**Hrs/week :6**	**Hrs/Sem :90**	**Credits :4**

Unit I

Theory of equations - Transformation of equations - Approximate solutions of equations - Horner's method and Newton's method

Unit II

Matrices Consistency and solution of equations - Characteristic equation of a matrix, Eigen values and Eigen vectors – Cayley - Hamilton theorem and simple problems

Unit III

Curvature and Radius of Curvature –Cartesian and polar co - ordination - Centre of Curvature - Evolutes

Unit IV

Vector Differentiation - Gradient - Curl - Divergence

Unit V

First order differential equations of higher degree - Equations solvable for p,x,y - Clairauts form - Linear equations of second and higher order with constant and variable co -efficients - particular integrals of the form x^n, $e^{ax}f(x)$

Text Book

S.Arumugam & Issac, Allied Mathematics, New Gamma Publishing House, Palayamkottai

Reference Books

1. Narayanan S., Kandaswamy P., Hanumantha Rao R., Manicavachagom Pillay T.K., **Ancillary Mathematics Volume – I**, S.Viswanathan (Printers & Publishers), PVT., LTD., 2010

2. Narayanan S., Kandaswamy P., Hanumantha Rao R., Manicavachagom Pillay T.K., **Ancillary Mathematics Volume – II**, S.Viswanathan (Printers & Publishers), PVT., LTD., 2010

SEMESTER III			
Core Skill Based Elective Instrumentation Physics			
Course Code: 21UPHS31	**Hrs/Week:2**	**Hrs/Sem:30**	**Credits:2**

Objectives:

1. To enrich students with the knowledge of instrumentation physics
2. To facilitate students in understanding the basic principles of instrumentation physics
3. To aid the students in measurement techniques

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	identify the types in instruments (K1)	4	Re
CO–2	evaluate arithmetic mean, deviation from the mean, average deviation, standard deviation (K5)	6	Ev
CO–3	summarize the characteristics of resting potential (K2)	4	Un
CO–4	compare active and passive transducers (K4)	4	An
CO–5	discuss the working of bio medical equipments (K2)	4	Un
CO–6	classify the applications of Physics in various field s of medicine (K3)	4	Ap

SEMESTER III			
Core Skill Based Elective	**Instrumentation Physics**		
Course Code: 21UPHS31	**Hrs/Week:2**	**Hrs/Sem:30**	**Credits:2**

Unit I: Measurement and Error

Definition – Accuracy and precision – Significant figures - Types of error (Gross error, Systematic error, Random error) – Statistical analysis (Arithmetic mean, Deviation from the mean, Average deviation, Standard deviation)

Unit II: Electrodes

Electrode potential– Purpose of the electrode paste - Electrode material – Types of electrodes – Depth and needle electrodes (2.4.6) – Surface electrodes – Chemical electrodes (Hydrogen electrode, pH electrode, pCO_2 electrode).

Unit III: Microscope

Optical microscope - Electron microscope – Comparison between optical and electron microscope – Resolving and Magnification power – Depth of focus –Types of electron microscope – TEM – SEM – Comparison between TEM and SEM.

Unit IV: Specialized and Advances in Medical Instruments

Angiography – Endoscopes – Computed Tomography (CT scan) – X-ray machine – Comparison of Fluoroscopy and Radiography – Computers in medicine – Lasers in medicine – Cryogenic surgery.

Unit V: Displays and Oscilloscope

Classification of displays – Display devices – Liquid crystal diode – Incandescentdisplay –Oscilloscope – Basic principle – CRT features – Block diagram of oscilloscope.

Text Books:

1. Albert D. Helfrick and William D. Cooper. *Modern Electronic Instrumentation and Measurement Techniques.* Prentice-Hall of India Pvt Limited. Reprint, 8th edition 2002.
2. Arumugam M. *Biomedical Instrumentation*. Anuradha Agencies. Reprint, 2002.
3. Kalsi H. S. *Electronic Instrumentation*. Tata Mc Graw Hill Education Pvt. Limited. Reprint 2012.

Books for Reference:

1. Mani P. *A textbook of Engineering Physics-I.* Dhanam Publications. Reprint, 2013.
2. Jose Robin G and Ubald Raj A. *Applied Physics*. Marthandam: Indira Publications. 3rd edition 1998.

SEMESTER III			
NME I	**Applied Physics I**		
Course Code: 21UPHN31	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Objectives:

1. To enrich students in the field of applied physics
2. To train students in domestic wiring
3. To understand basic principle behind air conditioning
4. To understand the theory of laser and applications of laser

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	identify tools used in the home (K1)	4	Re
CO –2	discuss the systems of domestic wiring (K2)	4	Un
CO –3	sketch the refrigerating cycle (K4)	4	An
CO –4	explain the function of a compressor (K2)	4	Un
CO –5	classify the types of emission of laser (K3)	4	Ap
CO –6	apply the application of laser in various fields (K3)	4	Ap

SEMESTER III			
NME I	**Applied Physics I**		
Course Code: 21UPHN31	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Unit I: Domestic Wiring

Introduction – Tools – Precautions in handling tools – Wires – Cables – Systems of domestic wiring (CTS wiring, conduit wiring) – Fuses.

Unit II: Electrical Appliances

Electric bell – Electric iron – Electric kettle – Hot plate – Fan (Electrical, Axial, Centrifugal).

Unit III: Air Conditioning

Principle – Refrigerating cycle – Refrigerants – Evaporators – Function of a compressor – Freezers – Ice plant – Water coolers.

Unit IV: Laser

Introduction– Stimulated Absorption – Principle of spontaneous emission and stimulated emission – Concept of laser - Population inversion – Pumping action – Characteristics of laser – Basic concepts of laser.

Unit V: Applications of Laser

Laser drilling – Laser cutting– Laser welding – Spot welding – Air pollution monitoring – Water pollution monitoring – Laser remote sensing.

Text Books:

1. Jose Robin G and Ubald Raj A. *Applied Physics*. Marthandam: Indira Publications. 3rd edition 1998.
2. Dr. Mani. P *A text book of Engineering Physics-I.* Dhanam Publications. 10thedition 2013.
3. Jose Robin G and Ubald Raj A. *Laser and its Applications*. Marthandam: Indira Publications. First Edition 2003**.**

Book for Reference:

1. Jose Robin G and Ubald Raj A. *Maintenance of Electrical Appliances*. Marthandam: Indira Publications. First Edition July 2017.
2. Kakani S L and Shubhra Kakani. *Photonics – Optoelectronics*. CBS Publishers &Distributors Pvt Ltd. First Edition 2017.

Semester – III			
Women's Synergy			
Code : 21UAWS31	**Hrs/ Week : 2**	**Hrs/Sem:30**	**Credits : 2**

Unit I - Physical Health

Woman's Structural Organisation – Levels of organisation – Body image - Reproductive health – Hormonal Cycle and its Psycho-somatic implications – Child birth – lactation – Nutritional status of women.

Unit II – Psychological Health

Examining factors determining psychological conditions of women – Depression, anxiety, stress, hysteria – Socio – cultural and familial conditioning of women's minds – Self Image, Discrimination against women.

Unit III – Women and Legal Awareness

Women specific – centered legislations – legal issues – laws to prevent gender based violence National / State Pro-women schemes – educational and Employment schemes. Laws for protection of Women – Women's rights to property – Women's Rights in the Indian Constitution – Maternity benefit act.

Unit IV – Women and Finance

Manager of domestic finance – Budgeting basics – Create a family budget - Set financial goals – Plan for financial emergencies – Budget for travel – Saving strategies – Investment options

Unit V – Women's Empowerment in Various Domain

Introduction - Women created history in sports and music – P. T. Usha, M. S. Subbulakshmi - Women who crossed hurdles in Social Service – Mother Theresa, Muthulakshmi Reddy, Medha Patkar - Role of Women in Indian independence movement and Politics – Indira Gandhi, Aruna Asaf Ali.

SEMESTER III	
Self Study Course	**Maintenance of Electronic Equipment and Photography**
Course Code : 21UPHSS3	**Credits :2**

(Compulsory)

Objectives:

1. To know the students how to apply the electronic components in physics laboratory
2. To make the students to measure the physical quantities using measuring instruments
3. To enhance the students to know about photography

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	list the different types of capacitors (K1)	4	Re
CO –2	discuss the method of soldering (K2)	4	Un
CO –3	compare audio frequency range and radio frequency bands (K4)	4	An
CO –4	present the usage of transducers (K3)	4	Ap
CO –5	define the terms of film structure and film speed (K1)	4	Re
CO –6	select the types of filter used in photography (K5)	4	Ev

SEMESTER III	
Self Study Course	**Maintenance of Electronic Equipment and Photography**
Course Code : 21UPHSS3	**Credits :2**

Unit I: Electronic Components

Active and passive components – Resistances - Capacitors: Uses, Types of capacitors, Detecting faulty capacitors, Characteristics, Working Voltage – Soldering techniques – Groove board – Bread board – Printed circuit board.

Unit II: Measuring Instruments

Multimeter – Cathode Ray Oscilloscope – Liquid Crystal Display – Audio Frequency Oscillator.

Unit III: Transducers

Transducer: Classification, Basic requirements – Inductive transducer – Piezoelectric transducer – Capacitive transducer – Resistive transducer: Potentiomentric type, Wheatstone bridge type.

Unit IV: Photography I

Camera – Photographic camera – Parts and their functions – Camera lens: Types – Camera lens shutters: Types.

Unit V: Photography II

Film structure – Film speed – Exposure triangle – Flash photography - Camera lens filter – DSLR camera – Digital format in DSLR camera.

Text Book:

1. Jose Robin G and Ubald Raj A. *Maintenance of Electronic Equipment & Photography*. Marthandam: Indira Publications. First Edition 2017.

SEMESTER – IV			
Part-1 பொதுத்தமிழ் - தாள் 4 சங்க இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, நாடகம்)			
Course Code: 21ULTA41	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

- மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து, வாழ்வில் அவற்றைப் பின்பற்றவழிவகுத்தல்.
- இலக்கியமாந்தரின் மூலம் நல்லவாழ்க்கை அனுபவங்களைப் பெறச் செய்து தன்னம்பிக்கை, ஆளுமைத் திறம், மொழி அறிவு இவற்றை உருவாக்குதல்.

Course Outcome:

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	அனுபவ அறிவை வளர்க்கிறது.	நடைமுறைப்படுத்தல்
CO-2	பழந்தமிழர் வாழ்வியல் முறைகளை கற்று பயனடைய உதவுகிறது.	நடைமுறைப்படுத்தல்
CO-3	மனிதநேயம், இறைநம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்
CO-4	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை உருவாக்குகிறது	நடைமுறைப்படுத்தல், உருவாக்கம்
CO-5	சமுதாய பிரச்சினைகளை எதிர்கொள்ளும் திறம் கிடைக்கிறது.	நடைமுறைப்படுத்தல், திறன் மேம்பாடு
CO-6	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல், திறன் மேம்பாடு

SEMESTER – IV			
Part-1 பொதுத்தமிழ் - தாள் 4 சங்க இலக்கியம் **(செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, நாடகம்)**			
Course Code: 21ULTA41	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

அலகு - 1 செய்யுள் - 2 மணி
எட்டுத்தொகை

1. நற்றிணை - பாடல்கள் : 64, 318
2. குறுந்தொகை - பாடல்கள் : 3, 20, 75
3. ஐங்குநுறூறு - செலவு அழுங்குவித்தப் பத்து - பாடல்கள் : 304, 307, 308, 309
4. பதிற்றுப்பத்து - பாடல் : 25
5. பரிபாடல் - பாடல் 6 (1-10 அடிகள்)
5. கலித்தொகை - பாடல் : 51
6. அகநானூறு - பாடல்கள் : 20, 194
7. புறநானூறு - பாடல்கள் : 191, 204

பத்துப்பாட்டு
மதுரைக்காஞ்சி - 63 வரிகள்

அலகு -2 இலக்கணம் - 1 மணி
1. **பாவகைகள்** - வெண்பா,ஆசிரியப்பா பொது இலக்கணம்
2. **அணி இலக்கணம்** -
உவமை,உருவகம், வேற்றுமை, வஞ்சப்புகழ்ச்சி, சிலேடை, தற்குறிப்பேற்றம்
3. வாக்கிய வகைகள்

4. பிறமொழிச் சொற்களைநீக்கிஎழுதுதல்
அ. ஆங்கிலச் சொற்கள்
ஆ. வடமொழிச் சொற்கள்
இ. தெலுங்குச் சொற்கள்

அலகு 3 இலக்கியவரலாறு - 1 மணி
1. எட்டுத்தொகை நூல்கள்
2. பத்துப்பாட்டு நூல்கள்
3. சங்க இலக்கியத்தின் தனிச்சிறப்புகள்
4. நாடகம் - தோற்றமும் வளர்ச்சியும்

அலகு - 4 உரைநடை - 1மணி
இலக்கியத் தென்றல் - தமிழ்த்துறை - கட்டுரைத் தொகுப்பு,
தூய மரியன்னைகல்லூரி (தன்னாட்சி), தூத்துக்குடி

அலகு -5 நாடகம் - 1 மணி
ஆயிரம் பூக்கள் மலரட்டும் - கீழ்க்குளம் வில்லவன

SEMESTER – IV			
Course Title : PART – I French Paper – IV French Course and Literature			
Course Code : 21ULFA41	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Objectives

To create and develop the taste for literary readings in the target language.

To motivate students to appreciate the French literature.

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	reflect upon the author's ideas and transform their own personality	Un
2.	explore a literary text, with the perspective of analyzing the content and manner of writing	Un, An
3.	create critical appreciations	Ev
4.	evaluate the literary piece in comparison with any other of another language	An, Ap
5.	identify grammar rules in literary text and apply the grammatical knowledge to do grammar exercises	Re, Un, Ap
6.	discover, interrogate and reflect on the humanistic value	An

SEMESTER – IV			
Course Title : PART – I French Paper – IV		**French Course and Literature**	
Course Code : 21ULFA41	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Unit 1 – XVII^{e}siècle

1.1 – Le Corbeau et le Renard - Jean de la Fontaine
1.2 – Le Petit Chaperon Rouge - Charles Perrault
1.3 – Le Passe Composé

Unit 2 – XVIII^{e}siècle

2.1 – Zadig : La danse - Voltaire
2.2 – La Révolution française
2.3 – L'imparfait

Unit 3 – IX^{e}siècle

3.1 – Chansons d'automne - Paul Verlaine
3.2 – Le Père Goriot *(extrait)* - Honoré de Balzac
3.3 – Les Pronoms relatifs

Unit 4 – XX^{e}siècle

4.1 – Le Pont Mirabeau - Guillaume Apollinaire
4.2 – L'Etranger *(extrait)* - Albert Camus
4.3 – Les Indicateurs temporels

Unit 5 – La littérature francophone

5.1 – Le Grand Cahier *(extrait)* - Agota Kristof
5.2 – Le fils à la recherche de sa mère - Pape Faye
5.3 – Le Futur proche et le futur simple

Books, Journals and Learning Resources

- K. Madanagobalane, N.C.Mirakamal.*Le Francais par les Textes*. Chennai :Samhita Publications, 2019.
- Blondeau Nicole, Allouache Ferroud jà, Ne Marie-Françoise.*Littérature Progressive du Français*.Paris : CLE International,2004.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLE International, 2003.
- Akyuz Anne,Bazelle-Shahmaei Bernadette, Bonenfant Joelle, GliemannMarie-Francoise.*Les 500 exercices de grammaire*. Paris : Hachette livre,2005
- Grégoire Maria.*Grammaire Progressive du français*. Paris :CLE International,2002.
- Sirejols Evelyne, TempestaGiovanna,Grammaire. *Le Nouvel Entrainez-vous avec 450 Nouveaux Exercices.* Paris : CLE International, 2002
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com
- https://www.conte-moi.net/node/120

SEMESTER – IV			
Part II English Poetry, Prose, Extensive Reading and Communicative English - IV			
Course Code 21UGEN41	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- To advance students' understanding of literary art and writings of universal appeal.
- To further the proficiency of communicative English through literary studies.

Course Outcome:

CO.No.	**Upon completion of this course, students will be able to**	**PSO Addressed**	**CL**
CO-1	comprehend better the language and literary components of texts	1	Un
CO-2	gain deeper insight into literary experience and expressions of writers	2	Un
CO-3	be competent in conversational and functional English	3	Ap
CO-4	employ nuances of verbal and non-verbal techniques in communication	5, 6	Ap
CO-5	adopt right perspectives of human values for life	4, 5	Ap
CO-6	face interviews and competitive exams with confidence	7	Ap

SEMESTER - IV			
Part II English Poetry, Prose, Extensive Reading and Communicative English - IV			
Course Code :21UGEN41	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Unit I –Poetry

John Keats – Bright star, would I were steadfast

E.E. Cummings – I carry your heart with me

Jayanta Mahapatra – Relationship

Unit II – Prose

Helen Keller – Three Days to See

Jerzy Kosinski – TV as a Baby Sitter

Bhabani Bhattacharya – Names are not Labels

Unit III – Fiction

Thomas Hardy – *Tess of the d' Urbervilles* (Abridged Version)

Unit IV – Grammar

Types of Sentences, Transformation of Sentences

Unit V – Communication Skills

Verbal and Non-Verbal Communication, Interview, CV- Resume, Presentation Skills

Text Books:

Units I – III – Compiled by the Research Department of English.

Units IV – Joseph, K.V. *A Textbookof English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006.

Unit V – CLIL (Content& Language Integrated Learning) – Module IV by TANSCHE.

SEMESTER IV			
Core IV	**Electronics and Communication**		
Course Code: 21UPHC41	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Objectives:

1. To develop competent technocrats who can strive continuously in pursuit of professional excellence in the field of Electronics and Communication
2. To establish a unique learning environment to enable the students to face the challenges in Electronics and Communication Engineering field
3. To facilitate an understanding of circuit analysis, transistors and op amp

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall semiconductors (K1)	2	Re
CO –2	explain a universal divider bias (K2)	2	Un
CO –3	construct inverting and non inverting amplifier (K3)	2, 6	Ap
CO –4	summarize the types of networks (K2)	2	Un
CO –5	prove Thevenin's and Norton's theorem (K5)	2, 6	Ev
CO –6	outline the principle of amplitude modulation reception (K4)	2	An

SEMESTER IV			
Core IV	**Electronics and Communication**		
Course Code: 21UPHC41	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Unit I: Linear Circuit Analysis

Linear and non–linear circuit elements – Active and Passive elements – Ideal voltage source and current source – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem – h-parameters.

Unit II: Transistors

Function Transistor – Transistor Action – Relation connecting Alpha and Beta of a transistor – Three modes of transistor connection – Relation between alpha, beta and gamma – Current components in a transistor and relation connecting I_c and I_b – Load line, Q point, biasing and stabilization – Methods of transistor biasing – Fixed bias or base bias circuit – Collector feedback bias – Universal divider bias.

Unit III: Operational Amplifiers

Operation of Differential amplifier – CMRR – Important Characteristics – Slew Rate – Inverting amplifier – Non inverting amplifier – Gain – Voltage follower – Multistage op-amp circuits – Summing amplifier – Difference amplifier – Integrator and Differentiator using op-amp.

Unit IV: Amplitude Modulation and Transmission

Introduction – Elements of a communication system – Noise – Signal to Noise ratio – Noise figure – Modulation – Need for modulation – Different kinds of modulation – Bandwidth required for transmission – Amplitude modulation – Wave forms, side bands and power – Transmission of Radio waves: AM Transmitter – Broadcast AM Transmitter – High level AM Transmitter – Low level AM Transmitter.

Unit V: Amplitude Modulation - Reception

Radio Amplitude modulation – Comparison of AM Systems – Quadrature Amplitude Modulation (QAM) – Generation of QAM signal – AM Receivers – Demodulation (AM Detection) : Envelope detector – Tuned Radio Frequency (TRF) Receiver (Straight Receiver) – Super heterodyne receiver – Characteristics of a receiver (Receiver parameters) – Choice of Intermediate frequency for heterodyne receiver – Communication receiver: Double frequency conversion A.M receiver.

Text Books:

1. Jose Robin G and Ubald Raj A. *Electronics*. Marthandam: Indira Publication, First Edition 2000.

Books for Reference:

1. Jose Robin G and Ubald Raj A. *Communication Electronics*. Marthandam: Indira Publications. First Edition 2002.
2. Bargava N. N, Kulshreshtha D. C. and Gupta S. C. *Basic Electronics and linear circuits*. New Delhi: Tata McGraw Hill Publishing company Ltd. Reprint, 2012.

SEMESTER – IV			
Core Practical II			
Course Code : 21UPHCR2	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Any 14 experiments:

1. Potentiometer – Calibration of low range voltmeter.
2. Potentiometer – R1/R2 and specific resistance
3. Potentiometer – Ammeter calibration
4. LCR series resonance circuit
5. LCR parallel resonance circuit
6. Absolute capacity of a capacitor – B.G
7. Desauty's Bridge –Determination of C in series & parallel
8. Comparison of E1/E2 & C1 /C2 – B.G
9. Bridge rectifier
10. Zener Characteristics
11. RC and LC filters
12. Amplifier CE mode – Without feedback
13. Spectrometer –Normal incidence – Grating
14. Spectrometer – i –d curve – Prism
15. Owen's bridge
16. Field along the axis of the coil – m & B_H
17. Measurement of inductance, capacitance and resistance using LCR meter

SEMESTER-IV			
Part III	**Allied Mathematics-II**		
Code : 21UMAA41	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Vision:
Aims to help physical science students to achieve their goals and to develop their mathematical skills.

Mission:
To help students to appreciate the uses of derivatives and integrals in day today life and solve real life problems.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	POs addressed	CL
CO-1	identify the difference between partial differential equation and ordinary differential equation	1	An
CO-2	classify various types of partial differential equations and form the partial differential equation	3	Un
CO-3	solve differential equations using Laplace transform	5	An
CO-4	set up the regions and integrate double integrals in rectangular and polar coordinates.	2	Ev
CO-5	use Green's theorem to evaluate line integrals along simple closed contours of the plane	3	Cr
CO-6	identify and understand the concept of Beta integrals and Gamma integrals	2	Ap

Semester –IV			
Part III	**Allied Mathematics – II**		
Code : 21UMAA41	**Hrs/week :6**	**Hrs/Sem :90**	**Credits:4**

Unit I

Partial differential equation –first order formation - types of solutions - four standard forms - Lagrange's form

Unit II

Laplace transforms - inverse Laplace transform - application to solution of differential equations (except simultaneous equations)

Unit III

Jacobian – Vector Integration –Line Integral, Surface Integral

Unit IV

Vector integration - Volume integrals-Verification of Green's, Stoke's and Gauss Divergence theorems (simple problems only).

Unit V

Evaluation of integrals using Beta and Gamma functions

Text Book

S.Arumugam and Issac, Allied Mathematics, New Gamma Publishing House, Palayamkottai

Reference Books

1. Narayanan S., Kandaswamy P., Hanumantha Rao R., Manicavachagom Pillay T.K., **Ancillary Mathematics Volume – I**, S.Viswanathan (Printers & Publishers), PVT., LTD., 2010
2. Narayanan S., Kandaswamy P., Hanumantha Rao R., Manicavachagom Pillay T.K., **Ancillary Mathematics Volume – II**, S.Viswanathan (Printers & Publishers), PVT., LTD., 2010

SEMESTER IV			
Skill Based Elective	**Physics for Competitive Examinations**		
Course Code : 21UPHS41	**Hrs./Week :2**	**Hrs./Sem : 30**	**Credits :2**

Objectives:

1. To prepare the students for competitive exams and make them competent in facing the challenges with confidence
2. To motivate students to face and pursue higher education through competitive Examinations
3. To equip students with the basic principles of physics and apply the same in solving problems

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	evaluate the problems in gravitation and escape velocity (K5)	4	Ev
CO –2	recall surface tension and viscosity (K1)	4	Re
CO –3	discuss the laws of thermodynamics (K2)	4	Un
CO –4	distinguish the interference from diffraction (K4)	4	An
CO –5	apply Kirchhoff's laws to solve problems (K3)	4	Ap
CO –6	explain problems in electromagnetic induction (K2)	4	Un

SEMESTER IV			
Skill Based Elective	**Physics for Competitive Examinations**		
Course Code : 21UPHS41	**Hrs./Week :2**	**Hrs./Sem : 30**	**Credits :2**

Unit I: Properties of matter

Gravitation, Escape velocity and artificial satellite – Surface Tension and Viscosity – Elasticity.

Unit II: Heat

Laws of thermodynamics - Conduction and radiation.

Unit III: Optics

Interference – Diffraction, Resolving power (Prism & Grating) and Polarisation.

Unit IV: Electricity and Electromagnetism

Kirchhoff's laws and Steady current – Electromagnetic Induction - Alternating Current.

Unit V: Semiconductors

PN junction diode – Zener diode – Transistor: Transistor as an amplifier, Transistor as an oscillator.

Text Books:

1. Dr. Kakani S.L. *Objective Physics*. Sultan Chand and sons Ltd. 10th revised edition 2001.

Book for Reference:

1. Satya Prakash and Er. Vibhav Saluja. *Objective Physics*. Meerut: Prakashan publications. 27th revised edition 2010.

SEMESTER IV			
NME II	**Applied Physics II**		
Course Code : 21UPHN41	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Objectives:

1. To enlighten students to be aware of solar energy sources
2. To make students understand the working of windmills, OTEC and Geothermal process used for power generation and biomass energy conversion
3. To enrich the knowledge of our students on communication physics
4. To make students knowledgeable on nano physics

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	construct solar cookers (K3)	3	Ap
CO –2	recall conventional and nonconventional energy source (K1)	3	Re
CO –3	discuss the different types renewable energy sources (K2)	`3	Un
CO –4	understand the Physics behind EEG, ECG etc (K2)	3,4	Un
CO –5	Categorize the types of optical fibres (K4)	1	An
CO –6	Select the nanophase materials based on the applications (K5)	4	Ev

SEMESTER IV			
NME II	**Applied Physics II**		
Course Code : 21**UPHN41**	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Unit I: Energy Physics – I

Conventional and non conventional energy sources (Introduction) – Solar energy – Solar cooker(box type) – Solar ponds – Solar Crop Dryers – Solar Water Heater - Water Desalination.

Unit II: Energy Physics – II

Bio mass energy – Biomass conversion process digestion - Ocean Thermal energy - Geothermal Energy – Wind Energy.

Unit III: Medical Physics

Nuclear medicine - Radiation Therapy - Magnetic Resonance Imaging (MRI) –Endoscopy– Electroencephalogram (EEG) – Electrocardiogram (ECG) – Cardiac Pacemaker – Blood Pressure Apparatus (Sphygmomanometer).

Unit IV: Fibre Optics

Introduction – Optical fibre and cable – Total internal reflection - Principles and propagation of optical fibre – Acceptance angle – Numerical aperture – Types of optical fibres (Material and Number of modes) – Fibre optic communication system – Advantages and disadvantages.

Unit V: Nanomaterials

Introduction**–** Definition – Special features of nanophase materials – Different forms of nanomaterials – Synthesis of nanomaterials (basics) – Preparation of nanomaterials: Pulsed laser deposition – Properties of nanophase materials - Applications of nanophase materials.

Text Books:

1. Jose Robin G and Ubald Raj A, *Energy Physics*. Marthandam: Indira Publications. First edition 2014.
2. Dr. Sr. GerardinJayam. *Physics Every day*. First Edition 2008.
3. Dr. Mani P. *A text book of Engineering Physics –I*. Dhanam Publication. Tenth Edition 2013.
4. Dr. Mani P. *A text book of Engineering Physics –II*. Dhanam Publication. Tenth Edition 2016.

Book for Reference:

1. Rai G.D. *Nonconventional Energy Sources*. Khanna Publishers. Reprint, 2014.
2. Ubald Raj A and Jose Robin G. *Solid State Physics*. Marthandam: Indira Publications. second edition 2018.
3. Murugeshan R and Kiruthiga Sivaprasath. *Optics and Spectroscopy*. S. Chand and Company Ltd. Ninth edition 2019.
4. Arumugam M. *Biomedical Instrumentation*. Anuradha Agencies. Reprint, 2002.

SEMESTER- IV			
Ability Enhancement Course: Yoga and Meditation			
Code: 21UAYM41	**Hrs/Week : 2**	**Hrs/Semester : 30**	**Credits: 2**

Course Outcome:

- To learn and practice various meditation, yoga methods to transform the ordinary life into a healthy, harmonious life leading to holistic wellbeing,
- To create an eco-friendly, loving and compassionate world.
- Acquire knowledge and skill in yoga for youth empowerment.
- Increase their power of concentration
- Learn the causes and ways to overcome fear and sadness.
- Create a ecofriendly, loving and compassionate world.

Unit I: Meditation (6 Hrs)

Meditation – Purposes of meditation– Major types of meditations: Zazen, Mindfulness, Vipasana, Yoga, Self-inquiry, Listening, Qi Gong, Taoist, Tantra– Health benefits of meditation: physical, psychological, spiritual– Meditation and Silence:Silence of the body, mind, heart,and beyond – General methodology of meditation – Tips for better meditation **Exercises**: Practicing Zazen meditation – Self-enquiry meditation exercises

Unit II: Self-Awareness (6 Hrs)

Awareness – Self-awareness – Importance of self-awareness – Shades of self-awareness – Difference between Awareness and Concentration – Power of concentration – Levels of concentration – How to increase concentration? – Beauty of living here and now – Ways to develop your presence – Self-awareness and Ecology: interconnectedness **Exercises**: Body Scan exercise – Self-Witnessing exercise – Eating Raisin with full awareness

Unit III: Yoga (6 Hrs)

Meaning and importance of yoga – Yoga and human physical system – Principles of Yoga – Different types of yoga – Yoga and balanced diet – Yoga and energy balance – Pranayama – Surya namaskaram– Basic asanas for healthy life – Therapeutic benefits of simple yogasanas – Naturopathy for common ailments.
Exercises:Practicing basic Asanas – Doing Sun Salutation

Unit IV: Mindfulness (6 Hrs)

Definition of mindfulness – Three components of mindfulness– Benefits of mindfulness – Mindfulness and Brainwave patterns – Myths about mindfulness – Scientific Facts about mindfulness – Formal method to practice mindfulness – Qualities of Mindfulness – Obstacles for mindfulness – informal ways of practicing mindfulness – Mindfulness to get rid of addictions
Exercises: Practice Mindful Walking –Practice Mindful Talking

Unit V: Heartfulness (6 Hrs)

Attitude to life – Power of positive attitude – Techniques to develop positive attitude – Positive vs negative people – Forms of negative attitude – Heartfulness – Managing fear: Basic 5 fears, Ways to overcome fear–Handling anger: Anger styles, Tips to tame anger – Coping with sadness: Causes and ways to overcome sadness, dealing with depression – Ultimacy of compassion: Compassion to oneself, towards others: Forgiveness, to nature: Seeing God in all

Exercises: Practice Loving-Kindness meditation– Doing compassionate actions

Text Book:

1) Thamburaj Francis. *Meditation and Yoga for Holistic Wellbeing.* Trichy:Grace Publication. 2019.

Books References:

1) Osho. *Meditation the Only Way*. New Delhi: Full Circle Publication, 2009.
2) Thamburaj Francis. *Journey from Excellence to Godliness: Zen Meditation for Transformation.* Grace Publication, Trichy, 2017.
3) Osho. *Awareness: The Key to Living in Balance*. New York: St.Martin's Griffin Publication, 2001.
4) Tolle Eckart.*The Power of Now: A Guide to Spiritual enlightenment.* New World Library, 2004.
5) Swami Gnaneswarananda. *Yoga for Beginners.* Calcutta: Sri Ramakrishna Math, 2010.
6) HanhThichNhat. *The Miracle of Mindfulness: An Introduction to the Practice of Meditation*. Beacon Press, 2016.
7) Kamlesh D. Patel and Joshua Pollock. *The Heartfulness Way: Heart-Based Meditations for Spiritual Transformation*. Westland Publications, 2018.

Assessment

Internal Assessment :

Class Exercises (Unit wise exercises as given in syllabus)	5x10	50
Homework (Assignment, Charts, Aids, creative works, etc)	5x 5	25

External Assessment

Objective Type Questions	5x10	25
Total	100	

SEMESTER IV	
Self Study Course **Electrical Wiring and Appliances**	
Course Code: 21UPHSS2	**Credits : + 2**

(Optional)

Objectives:

1. To produce competent students to handle electrical appliances and wiring in their home
2. To equip the students with adequate knowledge and skill in the field of electrical wiring and appliances
3. To know how to handle domestic appliances effectively

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	identify the tools used at home (K1)	4	Re
CO–2	discuss the system of domestic wiring (K2)	4	Un
CO–3	explain the principle of AC (K2)	4	Un
CO–4	classify the types of street lighting (K3)	4	Ap
CO–5	experiment the working of an electric iron (K3)	4	Ap
CO–6	sketch CFL (K4)	4	An

SEMESTER IV	
Self Study Course **Electrical Wiring and Appliances**	
Course Code: 21UPHSS2 (Optional)	**Credits : + 2**

Unit I: Domestic Wiring I

Introduction – Tools – Precautions in handling tools – Wires – Cables – General rules for wiring – Systems of domestic wiring.

Unit II: Domestic Wiring II

Tests to be carried out on wiring installation before commissioning – Good grounding and its need – Fuses – Switch wiring.

Unit III: Air Conditioning

Air conditioning – Principle – Refrigerating cycle – Refrigerants – Evaporators – Function of a compressor – Freezer.

Unit IV: Domestic Appliances - I

Tube light choke – Fluorescent light starter – Fluorescent lamp – Compact Fluorescent lamp – Street lighting – LED Street lighting – Solar street lighting system.

Unit V: Domestic Appliances - II

Wet Grinder – Mixer Grinder – Water Heater: Storage type – Electric Iron – Washing Machine.

Text Book:

1. Jose Robin G and Ubald Raj A. *Applied Physics.* Marthandam: Indira Publications. 1998.
2. Jose Robin G and Ubald Raj A. *Maintenance of Electrical Appliances*. Marthandam: Indira Publications. First edition 2017.

SEMESTER V			
Core V (Common Core)	**Material Science**		
Course Code : 21UPCC51	**Hrs./Week :6**	**Hrs./Sem :90**	**Credits :5**

Objectives:

1. To study the different crystal structures and crystal imperfections
2. To understand the usage of the appropriate materials while designing electronic system.
3. To enrich the students about the background theory and properties of different materials.
4. To classify different magnetic materials.
5. To appreciate different methods of synthesis of nanomaterials

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	identify the basic symmetry elements and operations of crystals, distinguish the types of crystals and enumerate the various crystal imperfections (K1)	2	Re
CO – 2	rank the properties of new materials like metallic glasses, shape memory alloys, high temperature materials, smart materials and biomaterials and apply them in various walks of life (K5)	2	Ev
CO – 3	justify the wave nature of the matter and its experimental study(K5)	2	Ev
CO – 4	distinguish magnetic materials based on susceptibility(K4)	2,1	An
CO – 5	summarise the uses of magnetic materials in various field (K2)	2,1	Un
CO – 6	outline the synthesis methods of nano materials(K4)	2,4	An

SEMESTER V			
Core V (Common Core)	**Material Science**		
Course Code :21UPCC51	**Hrs./Week :6**	**Hrs./Sem :90**	**Credits :5**

Unit I: Crystal Structure and Crystal Imperfections

Types of solids - Explanation of isotropy – Anisotropy - Symmetry of crystals - Plane of symmetry - Axis of symmetry - Centre of symmetry - Miller indices and determination - Crystal structure - Crystal lattice - Space lattice - Unit cells - Types of crystal systems - Classification of crystals on the basis of bonds - Ionic crystal - Crystal lattice of NaCl and CsCl - Lattice energy of ionic crystal - (Born-Haber cycle) - Molecular crystal - Dry CO_2 - Covalent crystal - Structure of diamond - Metallic crystal - Crystal defect - (vacancy, interstitial,impurity) – Semiconductors -solar cell - Liquid crystals - Types and its applications.

Unit II: New Materials

Shape memory alloys-Phases of shape memory alloys-Types-Characteristics-Applications

Metallic glasses- Glass transition temperature-Preparation-types-properties-applications

Intermetallic compounds-properties-classification-preparation-applications

High temperature materials-properties-types-applications

Biomaterials- Classification-types of dental cement and its applications.

Smart material-Properties-Components-Classification-application

Unit III: X-rays

X rays – Production – Properties - X ray spectra - Continuous and characteristic spectrum - Mosley's Law (Statement, explanation and importance) - Compton effect - Expression for change of wavelength.

Diffraction of X-rays - Bragg's law – Derivation of Bragg's equation - Experimental methods of X-ray study – Laue - Rotating crystal and powder methods.

Unit IV: Magnetic and Dielectric Materials

Classification of magnetic materials – Langvein theory of diamagnetism – Theory of paramagnetism – Domain theory of ferromagnetism – Antiferro magnetic materials – Application of Different magnetic materials.

Dielectric materials – Types of dielectric materials – Different types of electric polarization –Internal field – Clausius-Mossotti equation – Frequency and temperature dependence of dielectric constant.

Unit V: Nanomaterials

Nanomaterials – Synthesis – Techniques for synthesis: Plasma arcing, Chemical vapour deposition, Sol gels, Electro deposition, Ball milling – Properties of nano particles and

applications - Carbon nanotubes - Structure – Fabrication: Arc method, Pulsed laser deposition, Chemical vapour deposition - Properties – Applications.

Text Books:

1. Arun Bahl, Bahl B.S. and Tuli G.D. *Essentials of Physical Chemistry*. New Delhi: S. Chand & Company Ltd. 2008.
2. Rajendran.V. *Material Science.* New Delhi: Tata Mc Graw Hill Education Pvt. Ltd. 2012
3. Arumugam M. *Material Science.* Anuradha Publication. 2008.
4. Sri Vasta C M & Srinivasan C. *Science of Engineering materials*. New Age International (P) Ltd. Second Edition 1999.
5. Palanisamy P.K. *Solid state Physics* Copyright (2003). Chennai: Scitech Publication (India) Pvt Ltd. 3rd reprint, 2008.
6. Mureghesan R and Kiruthiga Sivaprasath. *Modern Physics*. S.Chand & Co Ltd. 17th Edition 2013.
7. Dr. Mani P. *A Text Book of Engineering Physics*. Chennai : Dhanam Publications. Revised Edition 2008.
8. Marikani A. *Materials Science.* Delhi: PHI Learning Pvt. Ltd. 2017.

Books for Reference:

1. Charles Kittel. *Introduction to solid state Physics.* John Wiley and Sons. 2010.
2. Palanisamy P.K. *Material Science.* Chennai: Scitech Publication (India) Pvt Ltd. 2005.
3. Fulekar M.H. *Nano Technology Importance and applications.* I.K International Publishing House Pvt Ltd. 2010.

SEMESTER V			
Core VI	**Digital Electronics**		
Course code: 21UPHC51	**Hrs./Week : 5**	**Hrs./Sem : 75**	**Credits :5**

Objectives:

1. To enlighten our students on the concepts of digital electronics.
2. To understand number systems
3. To understand logic gates and Boolean algebra
4. To gain knowledge to design electronic circuits like counters, registers, multivibrators, A/D and D/A converters

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall binary numbers (K1)	2,6	Re
CO –2	summariase the functions of encoder and decoder (K2)	2,6	Un
CO –3	construct logic gates (K3)	2, 6	Ap
CO –4	analyse the construction of counters and shift register (K4)	2,6	An
CO –5	distinguish A/D from D/A conversions (K4)	2, 6	An
CO-6	prove De Morgan's laws (K5)	2,6	Ev

SEMESTER V			
Core VI	**Digital Electronics**		
Course code: 21UPHC51	**Hrs./Week : 5**	**Hrs./Sem : 75**	**Credits :5**

Unit I: Number System

Number system-Binary, decimal, Octal, Hexadecimal numbers - Conversions - Excess–3 code - Binary coded decimal (BCD) – Gray code - Binary Arithmetic - Binary Addition – Subtraction of numbers by 2's complement and 1's complement method.

Unit II: Logic gates and Boolean Algebra

Positive and negative logic systems – Basic logic gates – Universal building blocks – NAND and NOR – The exclusive-OR gate (XOR gate) - Boolean algebra - Boolean equations of Logic circuits — De - Morgan's laws – Half and Full adder – Half and Full Subtractor – Parity checker and parity generator.

Unit III: Arithmetic circuits, Flip -flop and Multivibrators

R-S Flip flop – J-K Flip flop - J-K Master Slave Flip flop – D-Flip flop – T–Flip flop – 555 Timer – Monostable Multivibrator using 555 timer – Astable Multivibrator using 555 Timer – Frequency divider using 555 Timer.

Unit IV: Karnaugh Map and Combinational Circuit Applications

Sum-of-Products form – Product-of-sum form - Karnaugh Map – Two variable Map – Three variable Map – Four variable Map – Min-Term and Max- Term- Method's of addressing a cell in K-map- Don't care conditions – Multiplexer - Demultiplexer – Encoder – Decoders – BCD decoder.

Unit V: Shift Registers, Counters, A/D and D/A Conversion

Serial-in serial-out register - Serial-in Parallel-out register - Parallel-in serial-outregister - Parallel-in Parallel-out register - Counters – Binary counter – Decade counter – Up- Down counter – Synchronous and Asynchronous counters – Ripple counter – Ring counter - Mod-5 binary counter – Mod-10 counter - A/D and D/A Conversion – Resistive type – Binary ladder – Simultaneous conversion.

Text Book:

1. Jose Robin G and Ubald Raj A. *Digital Electronics.* Marthandam: Indira publications. Reprint, 2018.
2. Albert Paul Malvino and Donald P. Leach *Digital principles and applications.* 7th edition 2013.

Books for Reference:

1. Millman and Taub. *Integrated Electronics.* International student edition (TMH).
2. Jain R.P. *Modern digital Electronics.* Tata Mc Graw Hill Pvt. Ltd. 4th Reprint, 1988.

SEMESTER -V			
Core VII	**Computational Physics**		
Course Code : 21UPHC52	**Hrs./Week : 5**	**Hrs./Sem : 75**	**Credits : 5**

Objectives:

1. To have knowledge about the aspects of C++ language
2. To apply C++ language to write various programs for solving some important problems in Physics
3. To know about Microprocessor architecture and programming 8085

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	describe programs for solving various problems in physics (K1)	4	Re
CO –2	distinguish between one dimensional and two dimensional arrays (K4)	4	An
CO –3	summaries the various types of constructors (K2)	4	Un
CO –4	design a simple c++ program for function (K1)	4	Re
CO –5	test the program to write two hexadecimal numbers using 8085 (K5)	4	Ev
CO –6	solve arithmetic operations using 8085 (K3)	4	Ap

SEMESTER -V			
Core VII	**Computational Physics**		
Course Code : 21UPHC52	**Hrs./Week : 5**	**Hrs./Sem : 75**	**Credits : 5**

Unit I: Tokens and Expressions

Tokens – Keywords – Identifiers and Constants – Basic data types – User defined data types – Derived data types – Symbolic constants – Declaration of variables – Dynamic initialization of variables – Reference variables – Operators in C++ – Scope resolution operator – Memory management operators – Manipulators – Expressions and their types – Control structures.

Unit II: Functions, Classes and Objects

Introduction – The main function – Function prototyping – Call by reference – Return by reference – Inline functions – Default arguments.

Specifying class – A simple class example – Creating objects – Accessing class members – Defining member functions – Nesting of member functions – Private member functions – Arrays within a class – Arrays of objects – Objects as function arguments – Returning object.

Unit III: Constructors and Inheritance

Constructors – Parameterized constructors – Multiple constructors in a class – Copy constructors – Dynamic constructor – Destructors.

Defining derived class – Single inheritance – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance.

Unit IV: Microprocessor Architecture

Microprocessor – Microprocessor instruction set and computer language – Microprocessor architect and its operations – Input and output devices – 8085 MPU.

Unit V: Programming the 8085

8085 programming model – Instruction classification – Instruction and data format – How to write, assemble and execute simple programs – Instruction set – Data transfer operations – Arithmetic operations – Logical operations – Branching operations.

Text Book:

1. Balagurusamy E. *Object oriented programming with C++*. New Delhi: Tata McGraw – Hill publishing company Ltd. 4th Reprint, 2015.
2. Ramesh Gaonkar. *Microprocessor Architecture Programming and Applications with the 8085*. India: Penram International Publishing Private Limited. Fifth edition 2011.

Book for Reference:

1. Ravichandran D. *Programming in C++*. New Delhi: Tata Mc. Graw Hill Publishing company Ltd.

SEMESTER V			
Core Elective	**Renewable Energy Sources**		
Course Code: 21UPHI51	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Objectives:

1. To provide an understanding of the present energy crisis and various energy sources
2. To enhance the students to understand about renewable energy sources and their utilization
3. To create awareness among the students about sustainable utilization and conservation of natural resources

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	construct solar cooker (K3)	3	Ap
CO –2	analyse the working of windmills used for power Generation (K4)	3	An
CO –3	list the renewable energy sources available in surplus (K1)	3	Re
CO –4	explain different types of solar water heaters (K2)	3	Un
CO –5	sketch out the classifications of wave system (K3)	3	Ap
CO –6	recall green house effect (K1)	3	Re

SEMESTER V			
Core Elective	**Renewable Energy Sources**		
Course Code:21UPHI51	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Unit I: Solar Energy

Introduction – Solar constant - Solar radiation at the Earth's surface: Beam and diffuse solar Radiation, Attenuation of Beam radiation - Solar Radiation Measurements: Pyrheliometers, pyranometers, Sunshine Recorder – Solar pond introduction - Applications of Solar energy: Solar cooking (Box type solar cooker) - Solar Distillation - Solar green houses (Introduction, Types, advantages, parameters for plant growth).

Unit II: Wind Energy

Introduction – Basic Principles of Wind Energy Conversion: The nature of the wind– The power in the wind (only theory) – Wind energy conversion – Wind data and energy estimation – Site selection considerations – Basic components of a WECS (Wind Energy Conversion System) – Classification of WEC systems – Advantages and disadvantages of WECS – Applications of wind energy – Safety systems – Environmental aspects.

Unit III: Energy Conservation

An Economic Concept of Energy – Principles of Energy Conservation and Energy Audit – Types of Energy Audit – Energy Conservation Approach: Energy saving devices eligible for higher depreciation – Renewable energy devices eligible for higher depreciation – Co-Generation – Waste Heat Utilization – Heat Recuperators (Definition and Uses) – Heat Regenerators – Instrumentation and control.

Unit IV: Biomass Energy

Biomass classification – Photosynthesis - Biomass Conversion Process - Biomass conversion routes - Biogas plants - Gobar gas plants - Floating Dome gas plant - Deena Bandu model of gobar gas plant – Gasification – Gasifier - Advantages and disadvantages of biomass as energy source.

Unit V: Geothermal Energy

Geothermal power plant - Ocean Energy Thermal Conversion - Operation of OTEC - Merits and demerits of OTEC - Energy from tides - Under water tidal turbines - Merits and demerits of tidal energy plants - Energy from waves - Ocean wave energy - Advantages and disadvantages of wave energy.

Text Book:

1. Dr. Rai G.D. *Non conventional Energy Sources*. Khanna Publishers. Reprint, 2014.
2. Jose Robin. G and Ubald Raj A. *Energy Physics.* Marthandam: Indira Publications. First edition 2014.

Book for Reference:

1. Vaidyanathan G and Purniah V. *Energy and Environment*. Yes Dee Publication..2020.

SEMESTER – V			
Core Elective	**Mathematical Physics**		
Course Code: 21UPHE52	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Objectives:

1. To acquire knowledge about vector analysis
2. To identify the eigen value / eigen vector of the matrix
3. To calculate the integral transforms

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	recall scalar and vector function (K1)	6	Re
CO–2	discuss curl and divergence of a vector function (K2)	6	Un
CO–3	apply the fundamental properties of determinants (K3)	6	Ap
CO–4	evaluate problems in Fourier series (K5)	6	Ev
CO–5	analyse problems in Fourier transform (K4)	6	An
CO–6	discuss the properties of Laplace transform (K2)	6	Un

SEMESTER – V			
Core Elective	**Mathematical Physics**		
Course Code: 21UPHE52	**Hrs / Week:4**	**Hrs / Semester: 60**	**Credits: 4**

Unit I: Vector Analysis

Gradient of a scalar field – Lamellar vector field – Line, Surface and Volume Integral – Divergence of a vector function – Expression for divergence in Cartesian co-ordinates – Curl of a vector function – Expression for curl in Cartesian co-ordinates – Gauss divergence theorem – Stoke's Theorem – Green's Theorem.

Unit II: Theory of Determinants and Matrices

Determinants – Fundamental Properties of Determinants – Applications of the determinants – Matrix Methods – Application of Matrix methods – Solution of a system of linear equations – problem of linear inversion – Diagnolisation of a matrix – Eigen values and Eigen vectors.

Unit III: Fourier Series

Fourier Series – Dirichlet conditions – Applications of Fourier Series – Sawtooth wave – Square wave – Full Wave Rectifier – Half Wave Rectifier – Advantages of Fourier Series representation.

Unit IV: Integral Transform – I

Fourier Transform – Fourier Cosine Transform – Finite Fourier Cosine Transform – Fourier Sine Transform – Finite Fourier Sine Transform.

Unit V: Integral Transform – II

Laplace Transform – Laplace Transform of some functions – Properties of Laplace Transform – Inverse Laplace Transform – Partial Fraction Expansion – Applications of Laplace Transform – Simple harmonic motion – Simultaneous differential equations.

Text Books:

1. Murugeshan R. *Mechanics and Mathematical Physics*. S. Chand & company LTD. Reprint, Third edition 2018.
2. Chakrabarti P.K and Kundu S.N. *A Textbook of Mathematical Physics*. Reprint, Second edition 2001.
3. Chandra. *Textbook of Mathematical Physics*. Narosa Publishing House. Reprinted, Second edition 2009.

Books for Reference:

1. Satya Prakash. *Mathematical Physics*. New Delhi : Sultan Chand & sons. Sixth revised edition 2019.
2. Dass H.K. *Mathematical Physics*. S. Chand & company LTD. Fourth Revised Edition 2004.

Semester - V			
Common Skill Based Core	**Computer for Digital Era and Soft Skills**		
Code : 21UCSB51	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Course Outcome

- Identify different types of computer systems.
- Classify various types of software being used.
- Compare various digital payments and use them in day to day life.
- Recognise the innovative technologies IoT and integrate it in various fields.
- Analyze various social networking platforms and use them efficiently.
- Distinguish various cyber attacks and apply preventive measures.
- Understand the various soft skills needed to become successful.
- Analyze self and adapt oneself to work in a team.

Unit I: Fundamentals of Computers:

Introduction to computers- Components of computers-Working principle-Types of computers-Tablet-Notebook-Smart phone-PDA-Impact of computers on society-Types of software.

Unit II: Recent Trends in Computer Science and e-Governance:

IoT - applications- Mobile applications - E-Learning- E-Commerce - digital payments

Unit III: Social Media:

Face book-Twitter-Linked In-Instagram-Advantages of Social Networking-Issues/Risks of Social Networking-Protecting ourselves from social Networking problems-Cybercrimes-Hacking-Phishing- Cyber Security

Unit IV: Introduction to Soft Skills:

Learning objectives – What are soft skills?-Categories of Soft Skills-Integral Parts of Soft Skills.

Unit V: Understanding Self and Team Building:

Transactional Analysis (TA) - Structural analysis of Ego states- The functional model of Ego states - Egogram-Storkes - Life Position - Egogram and Life Positions Questionnaire-Team and Team Building- Features of effective creative teams

Books for Reference:

1. Peter Norton, Introduction to Computers 6th Edition
2. Charles P Pfleeger, Shari Lawrence Pfleeger, Security in Computing, I Edition, Pearson Education, 2003.
3. E.Balagurusamy, Fundamentals of Computers, McGraw Hill
4. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang , E-Commerce fundamentals and applications, Wiley Student edition
5. Benita Bhatia Dua, DeepaJeyaraman, Profit with Social Media, CNBC
6. Dr.K.Alex, Soft Skills, S.Chand & Co
7. http://www.digitalindia.gov.in/content/social-media-analytics
8. https://www.researchgate.net/publication/307878962_Introduction_to_E-Governance
9. http://www.ijqr.net/journal/v10
10. https://www.researchgate.net/publication/258339295_FUNDAMENTALS_OF_ COMPUTER _ STUDIES

SEMESTER V	
Self Study Course	**Biophysics**
Course Code : 21UPHSS3	**Credits :2**

(Optional)

Objectives:

1. To enhance the students to apply the principles and techniques of Physics to Biology
2. To make the students to know about the physiology of respiration and resolving power of eye which uses the principle of Physics
3. To know about gas transportation

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall Newton's law and Stoke's law (K1)	4	Re
CO –2	distinguish transverse waves from longitudinal waves (K2)	4	Re
CO –3	diagrammatically represent retina and photo receptor (K4)	4	An
CO –4	discriminate the transport of O_2 and CO2 in blood (K5)	4	Ev
CO –5	apply Poiseuillie's formula to determine the coefficient of viscosity(K3)	4	Ap
CO –6	summarise the physiological characteristics of sound (K2)	4	Un

SEMESTER V	
Self Study Course	**Biophysics**
Course Code : 21UPHSS3	**Credits :2**

(Optional)

Unit I: Bio Mechanics

Bio Statics: Forces and Torques – Bio Physics of Muscle – Strength of Bones – Bio Dynamics: Newton's Laws – Frictional Forces and Stoke's Law.

Unit II: Biophysics and Fluid Flow

Steady Laminar Flow: Coefficient of viscosity – Poiseuille's Formula: Velocity Profile – Continuity Equation – Flow network and equivalent resistance – Energetic of Fluid Flow – Turbulence – Reynolds Number – Hemodynamics.

Unit III: Biophysics and Gas Transport

The Ideal Gas – Dalton's Law of Partial Pressure – Vapour Pressure – Convective Transport of Gases – Transport of O_2 in Blood – Transport of CO_2 in Blood – Diffusion of Gases: Fick's Law – Gas exchange in lungs – Physiology of Respiration (Definitions associated with the operation of lungs)

Unit IV: Biophysics and Audition

Transverse and Longitudinal Waves – Wave Velocity – Intensity of a Wave – Physiological Characteristics of Sound – Human ear: Phase sensitivity and determination of direction – Non-linearity of ear response.

Unit V: Physics of Vision

Wave Nature of Light – Polarization – Particle Nature of Light – Geometrical Optics – Refraction – Gradient Index Lens – Spherical Aberration – Refractive Power – Refractive Power of Eye – Retina and photoreceptors – Resolving power of eye – Polarization and vision.

Text Book:

1. Srivastava P. K. *Elementary Biophysics*. Narosha Publishing House Pvt. Ltd. Reprint, 2006.

SEMESTER VI			
Core VIII	**Relativity and Quantum Mechanics**		
Course Code :21UPHC61	**Hrs./Week : 5**	**Hrs./Sem : 75**	**Credits : 4**

Objectives:

1. To acquire knowledge about 4D space and apply it to various physical problems
2. To understand the concepts of wave mechanics and its dualistic nature
3. To understand the physical interpretation of wave functions, expectation value, linkage between classical and quantum physics
4. To apply Schrodinger equation to 1D and 3D physical system

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	describe Michelson –Morley experiment (K1)	2	Re
CO –2	summarise the postulates of special theory of relativity (K2)	2	Un
CO –3	outline the De Brogli's hyposthesis for the dualistic nature of matter waves (K4)	2	An
CO –4	relate the uncertainty condition between displacement and momentum; energy and time (K3)	2	Ap
CO –5	prove Bohr's quantization condition for angular momentum (K5)	2	Ev
CO –6	apply to Schrodinger equation to 1D and 3D physical (K3)	2	Ap

SEMESTER VI			
Core VIII	**Relativity and Quantum Mechanics**		
Course Code : 21UPHC61	**Hrs./Week : 5**	**Hrs./Sem : 75**	**Credits : 4**

Unit I: Relativity

General theory – Michelson –Morley experiment – Postulates of special theory of relativity – Lorentz transformation – Length contraction – Time dilation – Relativistic condition of velocities – Simultaneity – Relativistic mass – Relativistic momentum – Mass and energy equivalence – Relation between total energy and rest mass, rest mass energy and momentum - Mass energy equivalence - Minkowski's Four dimensional space.

Unit II: Wave Properties of Matter

Wave particle duality – De-Broglie's Hypothesis for Matter waves – Concept of group velocity – Concept of Phase velocity – Relation connecting them – Analytical Expression for group of waves - Nature of radiation – Derivation of De-Broglie'swavelength – Velocity of De-Broglie's wave - Relation between the phase velocity and the wavelength of De-Broglie's wavelength - Diffraction of particles - Davisson and Germer's experiment - G.P. Thomson's experiment- Interference of electrons – Consequences of De-Broglie's concepts.

Unit III: Heisenberg's Uncertainty Principle

Uncertainty principle – Elementary proof Heisenberg's uncertainty relation - Uncertainty relation between displacement and momentum – Uncertainty relation between energy and time - Physical significance of Heisenberg's uncertainty Principle – Illustration - Diffraction of electrons through a slit - Gamma ray microscope thought experiment – Consequences of the uncertainty relation - Ground state energy of a particle in a box - Position of the electron in a Bohr orbit.

Unit IV: Schrodinger's Wave Equation

Introduction — Wave function for a free particle - Derivation of time dependent and time independent Schrodinger's equation - Physical interpretation of the wave function – limitation - Normalization of the wave function – Operators in quantum mechanics – Eigen functions, Eigen values and Eigen value equations – Operators for momentum, energy and total energy - Basic postulates of quantum mechanics - Orthogonality of Eigen function- Proof - Expectation values.

Unit V: Development of Quantum Mechanics

Introduction – Black body radiation – Theoretical laws of black body radiation – Plank's quantum theory – Photo-electric effect – Einstein explanation of photo electric effect – The Ritz combination principle in spectra – Stability of an atom, Bohr's quantization of angular momentum and its application to the hydrogen atom – Particle in one dimension and three-dimensional box.

Text Books:

1. Murugeshan R and Kiruthiga Sivaprasath. *Modern Physics*. S. Chand & Co. Ltd. 18th revised edition 2016.
2. Kamal Singh and Singh S. P. *Quantum Mechanics*. S. Chand & Co Ltd. 1998.

Books for Reference:

1. Brijlal and Subramanyam. *Modern Physics*. 8th edition 2007.
2. Rajam J. B. *Atomic Physics*. S. Chand & Co. 8th edition1981.

SEMESTER VI			
Core IX	**Atomic and Nuclear Physics**		
Course Code : 21UPHC62	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits :3**

Objectives:

1. To enrich our students with the knowledge of atomic physics
2. To study the properties of α, β, γ rays
3. To understand the process of radioactivity and its applications
4. To understand the working of accelerators and detectors

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall the structure of atoms (K1)	2	Re
CO –2	understand the structure of nucleus and nuclear models (K2)	2	Un
CO –3	distinguish the properties of α, β, γ rays and their decay (K4)	2	An
CO –4	analyze the key features of nuclear fusion and fission (K3)	2	Ap
CO –5	evaluate half life, mean life, amount of substance left after disintegration (K5)	2	Ev
CO –6	discuss the principle and working of particle accelerators and detectors (K2)	2	Un

SEMESTER VI			
Core IX	**Atomic and Nuclear Physics**		
Course Code :21UPHC62	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits :3**

Unit I: Atomic Structure

The Vector Atom Model – Quantum Numbers Associated with the Vector Atom Model Coupling Schemes – The Pauli Exclusion Principle – The Periodic Classification of Elements – Some Examples of Electron Configurations with their Modern Symbolic Representations – Magnetic Dipole Moment Due to Orbital Motion of the Electron – Magnetic Dipole Moment Due to Spin – The Stern And Gerlach Experiment – Optical Spectra – Fine Structure – Zeeman Effect – Larmor's Theorem – Quantum Mechanical Explanation of the Normal Zeeman Effect – Anomalous Zeeman Effect –Paschen-Back Effect – Stark Effect.

Unit II: Introduction to Nucleus

Introduction – Classification of nuclei – General properties of nucleus: Nuclear density, Nuclear charge, Spin angular momentum, Resultant angular momentum, Nuclear magnetic dipole moment – Binding energy – Nuclear stability – Theories of nuclear composition – Non-existence of electron within the nucleus – Nuclear forces – Meson theory of nuclear forces – Liquid drop model – The shell model – The Neutron: The discovery of theNeutron – Basic properties of the Neutron – Classification of Neutrons – Neutron Sources – Neutron Detectors.

Unit III: Radioactivity

Discovery of radioactivity – Natural radioactivity – Alpha, Beta and Gamma Rays – Properties of α, β, γ rays – Determination of e/m of α particles – Determination of charge of alpha particles – Range of alpha particles, Geiger Law, Geiger–Nuttal Law (definition only) – Theory of β decay – The nature of Beta Particles – Determination of e/m of β particles – Kaufmann's Experiment – Origin of γ rays – Nuclear isomerism – Soddy Fajan's Displacement law – Law of Radioactive disintegration – The mean life – Unit of Radioactivity – Law of successive disintegration – Biological Effects of Nuclear Radiations.

Unit IV: Nuclear Reactions

The discovery of artificial transmutation – Bohr's theory of nuclear disintegration – The Q–value equation for a nuclear reaction – Energy Balance in Nuclear Reactions and the Q–Value – Threshold energy of an Endoergic Reaction – Types of Nuclear reactions – Nuclear Transmutation – Artificial radioactivity: Discovery – Preparation – Applications. Nuclear Fission and Fusion: Discovery – Nuclear Fission – Energy Released in Fission– Chain Reaction

- Atom bomb – Nuclear reactor – Uses of Nuclear Reactor – Nuclear fusion – Sources of stellar energy – Thermonuclear reactions.

Unit V: Particle Accelerators and Detectors

Linear Accelerator – Cyclotron – Synchro-cyclotron – Betatron – Ionization chamber– Geiger Muller counter – Wilson cloud chamber - Scintillation counter.

Text Book:

1. Murughesan R and Kiruthiga Sivaprasath. *Modern Physics*. S.Chand & Co Ltd. 18th revised edition 2016.

Book for Reference:

1. Gupta A. *Modern Physics*. Book and Allied Pvt. Ltd. First edition 2006.
2. Tayal D. C. *Atomic and Nuclear Physics*. Himalaya Publishing House. 3rd revised edition 1998.

SEMESTER VI			
Core X	**Opto Electronics & Fibre Optic Communication**		
Course Code : 21UPHC63	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Objectives:

1. To expose the students to the fundamentals of optoelectronics
2. To facilitate the students to know the principles and characteristics of fiber optic communication
3. To enrich the students with the fundamentals of semiconductors

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall the basic principles of semiconductors (K1)	2	Re
CO –2	explain the formation of energy bands of semiconductors (K2)	2	Un
CO –3	outline the optical characteristics of semiconductors (K4)	2	An
CO –4	classify optical detectors (K3)	2	Ap
CO –5	analyze and classify the structure of optical fibres, its types and various optical losses (K4)	2	An
CO -6	outline the different types of optical losses (K4)	2	An

SEMESTER VI			
Core X	**Opto Electronics & Fibre Optic Communication**		
Course Code : 21UPHC63	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Unit I: Fundamentals of Semiconductors

Introduction – Light units – Formation of energy bands in semiconductors – Energy band diagram – Direct band gap and indirect band gap semiconductors – density of states – Expression for density of states – Electron concentration in an intrinsic semiconductor – Expression for hole concentration in the valence band of intrinsic semiconductor – Intrinsic carrier concentration – Effect of adding impurity on charge carriers – Mobility, current density and electrical conductivity –Optical absorption –Optical absorption coefficient.

Unit II: Optical Sources for Optical Fibres

LED – Laser – Fundamentals – Types: Ruby Laser – He-Ne Laser – Heterojunction Laser – CO_2 Laser – Optoelectronic couplers – Parameters of optoelectronic coupler.

Unit III: Optical Detectors

The need for optical detectors – Photodiode – Performance parameters of photodiode – Silicon p–i–n photodiode – Avalanche Photodiode – Phototransistor – Photomultiplier – Super luminescent diode – Photo thermistor.

Unit IV: Fibre Optics

Introduction – Different types of fibres – Light propagation through step index fibre: Acceptance angle – Numerical aperture – Numerical aperture of Graded index fibre – Losses in Fibre: Absorption Losses – Scattering Losses: Rayleigh Scattering loss and Mie scattering loss – Dispersion in fibres: Types of dispersion – Theory of material dispersion.

Unit V: Fibre Optic Communication

Analog optical communication system – Digital optical communication – Different generation in optical fibre communication – Advantages – Modulation: Different types of modulation methods – Modulation formats – External modulators: Electro optic modulators (Pockels Effect) – Acousto optic modulators – Demodulation Scheme: Homodyne and Heterodyne detection schemes.

Text Books:

1. Dr. Arumugam M. *Semiconductor Physics & Optoelectronics*. AnuradhaPublications. Reprint, First edition 2009.
2. Jose Robin G and Ubald Raj A. *Optoelectronics*. Marthandam: Indira Publication. Reprint, 2012.

Book for Reference:

1. Pallab Battacharya. *Semiconductor optoelectronic devices*. NewDelhi: Pearson Education. Second edition 2000.

3. Ajoy Ghatak. *Optics.* India: McGraw Hill Education Private Limited. Fourth reprint, 2014.
4. Ajoy Ghatak and Thyagarajan K. *Introduction to Fibre optics*. India: Cambridge University Press Pvt. Ltd. Reprint, 2011.
5. Subir Kumar Sarkar. *Optical fibre and fibre optic communication system*. S. Chand & company. Reprint, First edition 2008.

SEMESTER VI			
Core XI	**Advanced Physics**		
Course Code :21UPHC64	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits : 4**

Objectives:

1. To know about laser and its application in medicine industry
2. To study ‘what is thin film, its importance and applications
3. To know about polymers, superconductors and nuclear space materials

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall the fundamentals of laser (K1)	4	Re
CO –2	summarise the applications of laser drilling (K2)	4	Un
CO –3	classify the polymers(K3)	4	Ap
CO –4	outline the structure of polymers (K4)	4	An
CO –5	criticize BCS theory (K5)	4	Ev
CO –6	discuss the materials and their properties for nuclear and space applications (K2)	4	Un

SEMESTER VI			
Core XI	**Advanced Physics**		
Course Code :21UPHC64	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits : 4**

Unit I: Applications of Laser

Application of laser in material processing – Laser drilling – Laser cutting – Laser welding – Experimental welding – Air pollution monitoring – Water pollution monitoring – Propagation of laser radiation through atmosphere – Laser remote sensing – LIDAR – Raman LIDAR – Sensing wind velocity using laser.

Unit II: Thin film

Introduction – Nature of thin film – Resistance heating: Thermal evaporation, Flash evaporation, Multi evaporation – Rf or induction heating – Electron beam method – Cathodic sputtering: Glow discharge sputtering, Low pressure sputtering, Reactive Sputtering, R.F sputtering – Chemical vapour deposition – Substrate cleaning.

Unit III: Polymer Materials

Introduction – Polymerisation Mechanism: Addition, Condensation, Electrochemical polymerization – Degree of polymerization – Classification of polymers: Natural, Synthetic – Structure of polymer: One, Two, three dimensional polymers – Polymer processing – Properties of the polymers – Applications.

Unit IV: Superconductors

Superconductivity – Effect of magnetic field – The Meissner effect – Effect of current – Type I and Type II superconductors – Thermal properties – Isotope effect – London equations – BCS theory – flux quantisation – Josephson's effect – Application of superconductors – High T_C superconductor – Application of superconductor.

Unit V: Materials For Nuclear and Space Applications

Nuclear fuels – Fuel cladding – Moderators, Control materials – Coolants – Shielding materials – Space programme – Structural material and their properties – System requirements – Extreme high temperature materials for thermal protection – Pressure vessels – Lubrication.

Text Books:

1. Murugeshan R. *Optics and spectroscopy*. S. Chand & Co. 1995.
2. Coswami A. *Thin film fundamentals*. New Age International Publishers. Reprint, 2017.
3. Rajendran V. *Materials Science*. New Delhi: Mc Graw Hill Education Pvt Ltd. Reprint, 2018.
4. Palanisamy P. K. *Solid state Physics*. Chennai: Scitech publication (India) Pvt Ltd. 3rd Reprint, 2008.
5. Sri Vastava C M and Srinivasan C. *Science of Engineering materials and Carbon Nanotubes.* New Age International Publishers. Reprint, Third Edition 2012.

Books for Reference:

1. *Physics education*, volume 19, No.1, April – June 2002.
2. Dr. Mani P. *A text book of Engineering Physics II*. Dhanam Publications.

SEMESTER VI			
Core Practical III	**Non Electronics**		
Course Code : 21UPHCR3	**Hrs./Week : 3**	**Hrs./Sem : 45**	**Credits : 3**

Any 14 experiments:

1. Spectrometer – Cauchy's constants
2. Spectrometer – Hartmann's formula
3. Spectrometer – i-i'-curve
4. B. G – Comparison of mutual inductance.
5. B. G – Absolute determination of mutual inductance
6. B. G – High resistance by leakage
7. M. G –Thermo e.m.f.
8. Potentiometer – Calibration of high range voltmeter
9. Conversion of a galvanometer into ammeter and voltmeter
10. Anderson's Bridge – Self Inductance
11. Verification of Network's theorem – Thevenin's and Norton's theorem
12. Calcite Prism – Refractive Index
13. Determination of compressibility of given liquid using Ultrasonic Interferometer
14. Thermistor
15. Measurement of CO_2 concentration, humidity, temperature at various places and seasons

15. Measurement of intensity of light at different times and seasons
16. Determination of size of the particle using He –Ne Laser
17. Determination of wavelength of He – Ne laser source using grating
18. Determination of dielectric constant

SEMESTER VI			
Core Practical IV	**Electronics**		
Course Code : 21UPHCR4	**Hrs./Week : 3**	**Hrs./Sem : 45**	**Credits : 3**

Any 14 experiments

1. Dual power supply – using IC
2. Logic circuits (OR, AND, NOT, NAND and NOR) using discrete components
3. Single stage amplifier with and without feedback
4. Hartley oscillator
5. Colpitt's oscillator
6. Astable multivibrator – using 555 Timer
7. OP AMP – Adder and Subtractor
8. OP AMP – Differentiator and Integrator
9. OP AMP – Low pass and high pass filters
10. Verification of De Morgan's laws
11. Half and Full Adder
12. NAND and NOR as Universal building blocks
13. Solving Boolean expression
14. Monostable multivibrator – using 555 Timer
15. OP AMP – characteristics
16. Half and Full subtractor
17. Determination of V-I Characteristics of a solar cell

SEMESTER VI			
Core Practical V	**Computer Programming – C++**		
Course Code : 21UPHCR5	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

1. Simple arithmetic operations (i.e. addition, subtraction, multiplication and division) using do-while loop
2. Name of the day in a week using Switch–case statement
3. Validity of any entered character (whether it belongs to the alphabetical set or a number or a special character) using if else
4. Quadratic equation
5. Matrix addition and its transpose
6. Multiplication of two matrices
7. Factorial of a number using function declaration (with /without using the return statement)
8. (a) Displaying the content of an array using pointer arithmetic

   (b) Displaying the current date (such as day, month and year) using member function
9. Fibonacci numbers using constructor
10. Student details using inheritance concept
11. Period of a pendulum of given length L
12. Young's modulus from the data obtained from uniform bending method
13. Addition of two 8 bit data using immediate addressing mode
14. Subtraction of two 8 bit data using immediate addressing mode
15. Multiplication of two 8 bit data using immediate addressing mode
16. Largest number in a given set of numbers
17. Transfer the given set numbers in reverse order

SEMESTER VI			
Core XII	**Microprocessor 8086 and Microcontroller**		
Course Code : 21UPHC65	**Hrs./Week : 5**	**Hrs./Sem : 75**	**Credits : 4**

Objectives:

1. To develop background knowledge and core expertise in 8086 microprocessor and 8051 microcontroller
2. To expose the architecture and instruction set of 8086 microprocessor and 8051 microcontroller
3. To know about Assembly – Language programs

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	conclude the architecture of 8086 microprocessor (K5)	4	Ev
CO –2	categorize addressing modes of the 8086 microprocessor (K4)	4	An
CO –3	discuss the instruction set of the 8086 microprocessor (K2)	4	Un
CO –4	recall the basic introduction to 8051microcontroller (K1)	4	Re
CO –5	compile the assembly level programs using instruction set (K3)	4	Ap
CO –6	compare timers and counters (K4)	4	An

SEMESTER VI			
Core XII	**Microprocessor 8086 and Microcontroller**		
Course Code : 21UPHC65	**Hrs./Week : 5**	**Hrs./Sem : 75**	**Credits : 4**

Unit I: Architecture of 8086 Microprocessor

Introduction – Architecture of 8086 – Bus Interface Unit - Execution Unit – Fetch and Execute – Process of Fetching and Decoding of instructions – Registers – Data registers – Segment Registers – Pointer and Index Registers – Flag Register.

Unit II: Addressing modes of the 8086 Microprocessor

Logical and physical address – Address bus, Data bus, Control Bus – Memory Segmentation – 8086 memory addressing - 8-bit data from Even Address bank -8-bit data from odd Address bank – 16-bit data starting from Even Address bank – 16-bit datastarting from odd Address bank.

Unit III: Instruction set of the 8086 Microprocessor

Pin description of 8086 – Memory read and write bus cycle of 8086 – 8086 instruction set.

Unit IV: Introduction to Microcontroller

Introduction – Architecture of 8051 microcontroller – Memory organization – Pin diagram of 8051 microcontroller – Timers/ Counters – Serial communication,

Unit V: Instruction Set and Programming of the 8051 Microcontroller

Introduction – Addressing modes - 8051 instruction set – logical instructions – Data-transfer instruction - Boolean variable manipulation – Simple examples in assembly – Language programs of 8051 microcontroller – Assembly language programs.

Text Book:

1. Soumitra Kumar Mandal. *Microprocessors and Microcontrollers.* New Delhi: Tata McGraw Hill Education Private Limited.

Book for Reference:

1. Ram B. *Fundamentals of Microprocessors and Microcontrollers.* New Delhi: Tata McGraw Hill Education Private Limited. 2011.

SEMESTER VI			
Core Project			
Course Code : 21UPHP61	**Hrs./Week : 5**	**Hrs./Sem : 75**	**Credits : 4**

Course Outcome:

CO. No.	Upon completion of this course, students will be able to:	PSO addressed	CL
CO – 1	design, build and assess the working of scientific models individually as well as in groups (K6)	6	Cr
CO –2	plan research works related to crystal growth (K6)	6	Cr
CO –3	synthesize nano materials and compile the characteristics (K6)	6	Cr
CO – 4	assess the output of electronic projects (K5)	6	Ev
CO – 5	interpret the physical phenomena in theoretical projects (K4)	6	An
CO - 6	design solar appliances (K6)	6	Cr

GUIDE LINES:

The objective of the course is to train the students to gain confidence to carry out independent work, group work and get experience in handling of various equipments.

A maximum of five students combine together to do a project. Students are given freedom to choose the topic of the project. It may be theoretical or practical and may be from any one of the following areas

a) Physics –Theoretical

b) Physics – Experimental

c) Electronics

d) Computational Physics

e) Micro Processor

f) Interdisciplinary projects involving concepts of physics

Students carry out the project in about 30 hours in a laboratory. The students present the first oral report at the end of the first month, the second oral report at the end of the second month and final report at the end of approximately the third month. Students submit a group project report (dissertation) with a minimum of 25 pages.

Students are encouraged to take it as a challenge so that the result of the project shall be approved for publication in a leading journal.