BACHELOR OF SCIENCE

IN

PHYSICS

CURRICULUM AND SYLLABUS

(For Students admitted from academic year 2018 – 2019 onwards)

UNDER CHOICE BASED CREDIT SYSTEM

SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be **University** *u/s 3 of UGC Act, 1956)*

DEPARTMENT OF PHYSICS
FACULTY OF SCIENCE AND HUMANITIES
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
SRM NAGAR, KATTANKULATHUR – 603 203

B.Sc. Physics
(For students admitted from the academic year 2018–2019 onwards)

CURRICULUM AND SYLLABUS

Objectives:

1. To help the students to acquire a comprehensive knowledge and sound understanding of fundamentals of Physics.
2. To develop practical, analytical and mathematical skills of Physics.
3. To prepare students to acquire a range of general skills, to solve problems, to evaluate information, to use computers productively, to communicate with society effectively and learn independently.
4. To enable them to acquire a job efficiently in diverse fields such as Science and Engineering, Education, Banking, Public Services, Business etc.,

Eligibility:

The candidates seeking admission to the B.Sc. Degree program shall be required to have passed (10+2) (Higher Secondary) examination or any other equivalent examination of any authority, recognized by this University, with Physics, Chemistry and Mathematics.

Duration:

3 Years (6 Semesters)

STUDENT OUTCOMES

The curriculum and syllabus for the Bachelor degree in Physics (2018) conform to outcome based teaching learning process. In general, FOURTEEN STUDENT OUTCOMES (a-n) have been identified and the curriculum and syllabus have been structured in such a way that each of the courses meets one or more of these outcomes. Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program. Further each course in the program spells out clear instructional objectives which are mapped on to the student outcomes.

On successful completion of this Program, students will have the ability to

a) Apply knowledge of basic science, mathematics and computing appropriate to the discipline
b) Acquire knowledge and understanding of fundamental concepts, principles and theories related to the identified subject areas.
c) Acquire advanced knowledge in some areas of interest in physics and is familiar with contemporary research within various fields of physics.
d) Develop skills of critical thinking, hypothesis building, and to apply the scientific method to physics concepts, theoretical models and laboratory experiments.
e) Develop problem solving skill to, independently and creatively, identify and formulate problems and to plan and, use theoretical and/or experimental methods, carry out advanced tasks within specified time limits.
f) Develop the skill to combine and use knowledge from several disciplines to enter/propose novel ideas that require an analytic and innovative approach, and disseminate subject matter and results to both specialists and a broader audience.
g) Use computers effectively to solve problems through numerical methods and simulations and to analyze the data through available software.
h) Handle standard and advanced laboratory equipment, modern instrumentation and classical techniques to carry out experiments.
i) Develop skills to interpret and explain the limits of accuracy of experimental data in terms of significance and underlying theory.
j) *Collaborate and to lead collaborative work* to accomplish a common goal.

k) Understands the role of physics in the society and have the background to consider ethical, legal and security issues and responsibilities.
l) Demonstrate written and oral communication skills for dissemination of scientific results in report, article, or oral presentation formats.
m) Develop an adequate background for pursuing pedagogic education and international perspective on her/his discipline, and a commitment to life-long learning and professional development.
n) Assist in the creation of an effective project plan.

CONTENTS

CURRICULUM

B.Sc. (PHYSICS) **TOTAL CREDITS: 146**

SEMESTER I							
CAREER STREAM TITLE	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL L+T+P**	**C**
Language	ULT18101	Tamil–I	4	1	0	5	4
	ULH18101	Hindi–I					
	ULF18101	French–I					
Language	ULE18101	English–I	4	1	0	5	4
Major Core	UPY18101	Properties of Matter and Acoustics	4	1	0	5	4
	UPY18102	Classical Mechanics and Relativity	4	0	0	4	4
	UPY18103	General Physics Laboratory-I	0	0	4	4	2
Allied	UMA18A01	Allied Mathematics–I	4	1	0	5	4
Value Added Course*	CAC18101	Soft Skills	2	0	0	2	2
TOTAL			**22**	**4**	**4**	**30**	**24**

SEMESTER II							
CAREER STREAM TITLE	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL L+T+P**	**C**
Language	ULT18201	Tamil–II	4	1	0	5	4
	ULH18201	Hindi–II					
	ULF18201	French–II					
Language	ULE18201	English–II	4	1	0	5	4
Major Core	UPY18201	Electricity and Magnetism	4	1	0	5	4
	UPY18202	Electricity and Magnetism Laboratory	0	0	4	4	2

SEMESTER II							
CAREER STREAM TITLE	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL L+T+P**	**C**
Allied	UMA18A02	Allied Mathematics–II	4	1	0	5	4
Supportive Course*	UCA18E57	Basic Computer Skills	2	0	2	4	3
Value Added Course*	CAC18201	Quantitative Aptitude and Logical Reasoning – I	2	0	0	2	2
Extension Activity*	UNS18201	NSS	0	0	0	0	1
	UNC18201	NCC					
	UNO18201	NSO					
	UYG18201	YOGA					
TOTAL			**20**	**4**	**6**	**30**	**24**

SEMESTER III							
CAREER STREAM TITLE	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL L+T+P**	**C**
Major Core	UPY18301	Heat and Thermodynamics	4	1	0	5	4
	UPY18302	Mathematical Physics	4	1	0	5	4
	UPY18303	Thermal Physics Laboratory	0	0	4	4	2
Allied	UCY18A01	Allied Chemistry–I	4	0	0	4	4
	UCY18A02	Allied Chemistry Practicals–I	0	0	3	3	2
Skill Based Elective–I*	UPY18S01	Electronic Instrumentation	0	1	2	3	2
	UPY18S02	Workshop Practice					
	UPY18S03	Computer Programming (Matlab/Python)					
Non Major Elective – I		Open Elective – I	2	0	0	2	2
Value Added Course*	CAC18301	Quantitative Aptitude and Reasoning – II	2	0	0	2	2
TOTAL			**16**	**3**	**9**	**28**	**22**

SEMESTER IV							
CAREER STREAM TITLE	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL L+T+P**	**C**
Major Core	UPY18401	Quantum Mechanics	4	1	0	5	4
	UPY18402	Modern Optics	4	0	0	4	4
	UPY18403	Advanced Optics Laboratory	0	0	4	4	2
Allied	UCY18A03	Allied Chemistry – II	4	0	0	4	4
	UCY18A04	Allied Chemistry Practicals – II	0	0	3	3	2
Core Based Elective –I	UPY18C01	Elements of Earth Science	3	0	0	3	3
	UPY18C02	Solar Technology					
	UPY18C03	Low Temperature Physics					
Skilled Based Elective –II	UPY18S04	Atmospheric Observations	0	1	2	3	2
	UPY18S05	Digital Signal Processing					
	UPY18S06	Material Characterisation Techniques					
Non Major Elective – II		Open Elective – II	2	0	0	2	2
Minor Project**	UPY18404	My India Project	0	0	0	0	2
Value Added Course*	CAC18401	Verbal Ability and Reasoning	2	0	0	2	2
TOTAL			**19**	**2**	**9**	**30**	**27**

SEMESTER V							
CAREER STREAM TITLE	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL L+T+P**	**C**
Major Core	UPY18501	Solid State Physics	4	1	0	5	4
	UPY18502	Statistical Mechanics	4	1	0	5	4
	UPY18503	Analog and Digital Electronics	4	0	0	4	4
	UPY18504	Atomic Physics and Spectroscopy	4	0	0	4	4
	UPY18505	General Physics Laboratory–II	0	0	4	4	2

	UPY18506	Analog and Digital Electronics Laboratory	0	0	4	4	2
Core Based Elective – II	UPY18C04	Radiation Physics	3	0	0	3	3
	UPY18C05	Plasma Physics					
	UPY18C06	Astrophysics					
Supportive Course	UES18501	Environmental Studies	3	0	0	3	3
TOTAL			**22**	**0**	**8**	**30**	**26**

SEMESTER VI							
CAREER STREAM TITLE	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL L+T+P**	**C**
Major Core	UPY18601	Nuclear Physics	4	1	0	5	4
	UPY18602	Microprocessors and Microcontrollers	4	0	0	4	4
	UPY18603	Elements of Nanoscience and Nanotechnology	4	0	0	4	4
	UPY18604	Microprocessors Laboratory	0	0	4	4	2
Core Based Elective–III	UPY18C07	Computational Physics	3	0	0	3	3
	UPY18C08	Nonlinear Optics					
	UPY18C09	Semiconductor Device Physics					
Major Core	UPY18605	Core Based Project	0	0	8	8	4
Value Added Course*	CAC18601	Communication Skills	2	0	0	2	2
TOTAL			17	1	12	30	23

Legend:
L – Number of lecture hours per week
T –Number of tutorial hours per week
P –Number of practical hours per
C–Number of credits for the course
*Internal Evaluation Only
** Socially Relevant Project – Internal Evaluation Only

SUMMARY							
CAREER STREAM TITLE	**NO. OF COURSES (CREDITS IN BRACKET)– SEMESTER WISE**						**TOTAL SUBJECT WISE**
	I	**II**	**III**	**IV**	**V**	**VI**	
LANGUAGE– I (English)	1(4)	1(4)	–	–	–	–	**2(8)**
LANGUAGE– II (Tamil/ Hindi/French)	1(4)	1(4)	–	–	–	–	**2(8)**
MAJOR CORE (THEORY)	2(4)	1(4)	2(4)	2(4)	4(4)	3(4)	**14(56)**
MAJOR CORE (LAB)	1(2)	1(2)	1(2)	1(2)	2(2)	1(2)	**8(16)**
CORE BASED ELECTIVE(S)	–	–	–	1(3)	1(3)	1(3)	**3(9)**
SKILL BASED ELECTIVE(S)	–	–	1(2)	1 (2)	–	–	**2(4)**
ALLIED (THEORY)	1(4)	1(4)	1(4)	1(4)	–	–	**4(16)**
ALLIED (LAB)	–	–	1(2)	1(2)	–	–	**2(4)**
VALUE ADDED COURSE(S)	1(2)	1(2)	1(2)	1(2)	–	1(2)	**5(10)**
SUPPORT IV E COURSE(S)	–	1 (3)	–	–	1(3)	–	**2(6)**
EXTENSION ACTIVITY	–	1(1)	–	–	–	-	**1(1)**
MINOR PROJECT	–	–	–	1 (2)	–	–	**1(2)**
PROJECT	–	–	–	–	–	1(4)	**1(4)**
NUMBER OF CREDITS	**24**	**24**	**22**	**27**	**26**	**23**	**146**
TOTAL NUMBER OF CREDITS	**146**						

Allied Courses (offered to other departments)

COURSE CODE	COURSE TITLE	L	T	P	TOTAL L+T+P	C
UPY18A01	Allied Physics - I	4	0	0	4	4
UPY18A02	Allied PhysicsLaboratory - I	0	0	3	3	2
UPY18A03	Allied Physics - II	4	0	0	4	4
UPY18A04	Allied Physics Laboratory - II	0	0	3	3	2

Non–Major Electives (offered to other departments)

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	TOTAL L+T+P	C
III	UPY18E81	Energy Physics	2	0	0	2	2
	UPY18E82	Electrical Appliances					
IV	UPY18E83	Fundamentals of Nanoscience and Nanotechnology	2	0	0	2	2
	UPY18E84	Electronic Communication					

SEMESTER I

குறியீட்டு எண்	பாடம்	L	T	P	Total of LTP	C
ULT18101	**தமிழ்– I**	**4**	**1**	**0**	**5**	**4**

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		**Student Outcomes**				
1.	இரண்டாயிரம் ஆண்டுகாலத் தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப் பட்டுள்ளது.	e	f	h	m	n
2.	காலந்தோறும் தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள், அடையாளங்கள் ஆகியவற்றை காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதாகவும், மொழியின் கட்டமைப்பைப் புரிந்து கொள்வதாகவும் பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.	e	f	h	n	
3.	வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.	e	f	d	n	

பாடத்திட்டத்தின்நோக்கம்

- இரண்டாயிரம்ஆண்டுகாலத்தமிழின்தொன்மையையும்வரலாற்றை யும்அதன்விழுமியங்களையும்பண்பாட்டையும்எடுத்துரைப்பதாகஇ ப்பாடத்திட்டம்அமைக்கப்பட்டுள்ளது.
- காலந்தோறும்தமிழ்இலக்கியம்உள்ளடக்கத்திலும், வடிவத்திலும்பெற்றமாற்றங்கள், அதன்சிந்தனைகள், அடையாளங்கள்ஆகியவற்றைகாலந்தோறும்எழுதப்பட்டஇலக்கிய ங்களின்வழியாகக்கூறுவதாகவும், மொழியின்கட்டமைப்பைப்புரிந்துகொள்வதாகவும்பாடத்திட்டம்வ டிவமைக்கப்பட்டுள்ளது.

- வாழ்வியல்சிந்தனைகள்,ஒழுக்கவியல்கோட்பாடுகள், சமத்துவம், சூழலியல்எனப்பலகூறுகளைமாணவர்களுக்குஎடுத்துரைக்கும்விதத்தில்இப்பாடத்திட்டம்உருவாக்கப்பட்டுள்ளது.

அலகு – 1

இக்காலக்கவிதைகள்– 1

1. பாரதியார் – கண்ணன்என்சேவகன்
2. பாரதிதாசன் – தமிழ்ப்பேறு
3. அப்துல்ரகுமான் – அவதாரம்
4. மீரா –கனவுகள் +கற்பனைகள் = காகிதங்கள்
5. து. நரசிம்மன் – மன்னித்துவிடுமகனே

அலகு – 2

இக்காலக்கவிதைகள்– 2

1. ராஜாசந்திரசேகர் – கைவிடப்பட்டகுழந்தை
2. அனார் – மேலும்சிலஇரத்தக்குறிப்புகள்
3. சுகிர்தராணி – அம்மா
4. நா.முத்துக்குமார் –தூர்

அலகு – 3

சிற்றிலக்கியம்

1. கலிங்கத்துப்பரணி – பொருதடக்கைவாள்எங்கே (ப ாடல்– 485)
2. அழகர்கிள்ளைவிடுதூது–இதமாய்மனிதருடனே (கண்ணி – 45)
3. நந்திக்கலம்பகம் – அம்பொன்றுவில்லொடிதல் (ப ாடல் – 77)
4. முக்கூடற்பள்ளு –பாயும்மருதஞ்செழிக்கவே (பாடல் – 47)
5. குற்றாலக்குறவஞ்சி – ஓடக்காண்பதுமே (பாடல்– 9)

காப்பியங்கள்

மணிமேகலை – உலகவறவிபுக்ககாதை – “மாசுஇல்வால்ஒளி!–இந்நாள்போலும்இளங்கொடிகெடுத்தனை”. (28அடிகள்)

அலகு – 4 – தமிழ்இலக்கியவரலாறு

1) சிற்றிலக்கியம்–தோற்றமும்வளர்ச்சியும், 2) புதுக்கவிதை–தோற்றமும்வளர்ச்சியும், 3) சிறுகதை–தே ாற்றமும்வளர்ச்சியும், 4) புதினம்–தோற்றமும்வளர்ச்சியும், 5) உரைநடை–தோற்றமும்வளர்ச்சியும்

அலகு–5

மொழிப்பயிற்சி :

1. கலைச்சொல்லாக்கம், 2. அகரவரிசைப்படுத்துதல், 3. மரபுத்தொடர் / பழமொழி, 4. கலைவிமர்சனம், 5. நேர்காணல்

உரைநடைப்பகுதி :

1. உ.வே.சாமிநாதையர்–சிவதருமோத்திரச்சுவடிபெற்றவரலாறு,
2. தஞ்சாவூர்க்கவிராயர்–கூஜாவின்கோபம்,
3. இரா.பச்சியப்பன் –மாடல்லமற்றையவை

பார்வைநூல்கள்

1. *கைலாபதி, க., தமிழ்நாவல்இலக்கியம் ,குமரன்பதிப்பகம், வடபழனி. 1968.*
2. *சுந்தரராஜன், பெ. கோ., சிவபாதசுந்தரம், சோ., தமிழில் சிறுகதை வரலாறும் வளர்ச்சியும், க்ரியா, சென்னை, 1989.*
3. *பரந்தாமனார், அ.கி., நல்லதமிழ்எழுதவேண்டுமா, பாரிநிலையம், சென்னை, 1998,*
4. *பாக்யமேரி, வகைமைநோக்கில்தமிழ்இலக்கியவரலாறு, என்.சி.பி. எச். பதிப்பகம், சென்னை, 2011*
5. *வல்லிக்கண்ணன், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், அன்னம், சிவகங்கை, 1992.*

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

Subject Code	Subject Title	L	T	P	Total of LTP	C
ULH 18101	HINDI – I	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	To express and communicate literature which is part of life	e	f	h	m	n
2.	To incorporate day to day personal and professionl life' s need to communicate in the language.	e	f			
3.	To help the students to imagine and express their mind through literature	e	f			

UNIT – I: PROSE

1. Bade ghar ki beti – Premchand
2. Vaishnav ki fislan – Harishankar parsai (vyangya katha)
3. Benam rishta – Mridula garg
4. Utsah – Ramchandar shukla (niband)
5. Puruskar – Jayshankar prasad
6. Hardam.com – Alka sinha

UNIT – II: ONE ACT PLAY

1. Mahabharat Ki Ek Sanjh – Bharat Bhushan Agrawal
2. Reed Ki Haddi – Jagdish Chandr Mathur

UNIT – III: CORRESPONDENCE

1. Official letter
2. Demi–official letter

UNIT – IV: CINEMA

1. Panchlight – Phanishwar Nath Renu
2. Chandi ka juta – Bal Shauri Reddi

UNIT – V: TECHNICAL TERMINOLOGY

TEXT BOOKS

1. Madhav Sontakke, *Prayojan Mulak Hindi.*
2. K.P.Thakur,A *Practical guide to English translation and composition.*

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	Assessment Tool	Cycle Test I	Cycle Test II	Model Examination	Assignment	Attendance	Total
	Marks	10	10	20	5	5	50%
End Semester Weightage							50%
Total							100%

Subject Code	Subject Title	L	T	P	Total of LTP	C
ULF18101	FRENCH-I	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	To encourage greater written skills through comprehension writing and composition writing	e	f	h	m	n
2.	Improve their oral and written skills through a combination of theory and practice.	e	f			
3.	Extend and expand their savoir-faire through the acquisition of latest skills and techniques by practical training.	e	f			

Unité – I: Salut

Saluer– Entrer en contact avec quelqu'un – se présenter – s'excuser–*tu* ou *vous* ? Les jours de la semaine – Quelques formules de politesse – L'alphabet – Quelques consignes de classe – Je, tu, vous, il. Elle – Etre – Quelques nationalités –Masculin et féminin –Les nombres de 0 à 10 – Quelques sigles.

Unité – II: Enchanté

Demander de se présenter – Présenter quelqu'un – La négation : ne…pas – Les adjectifs possessifs –Etre, avoir+quelques verbes en –er – C'est, il est – L'interrogation par l'intonation – Quelques professions – Les nombres de 11 à 69 – Oui, non, si. **J'adore !**– Exprimer ses gouts –échanger sur ses projet – Aller – Moi aussi – Nous, ils, elles – La conjugaisons des verbes en –er être et avoir – Faire du, de l', de la +sport – Les nombres après 69 – On=nous

Unité – III: Tu veux bien

Demander à quelqu'un de faire quelque chose – Demander poliment – Parler d'actions passées –Il y a – Les articles définis et indéfinis – Les marques du

pluriel des noms – Les pronoms après une préposition (avec lui, chez, moi) – Le passé composé – Pouvoir, vouloir, venir, connaître.

Unité – IV: On se voit quand ?

Proposer, accepter, refuser une invitation – indiquer la date – Prendre et fixer un rendez – vous –Demandez et indiquer l'heure –Les pronoms compléments directs me, te, nous, vous –Pourquoi ? Parce que – Quel(s), Quelle(s) –L'interrogation avec est – ce que – Finir– Savoir – L'heure et la date – Les mois de l'année – Quelques indicateurs de temps

Unité – V: Bonne idée !

Exprimer son point de vue positif et négatif – s'informer sur le prix – S'informer sur la quantité – Exprimer la quantité – La négation : ne …pas de – Les articles partitifs – Combien ? –Un peu de, beaucoup de,. –Qu'est–ce que, combien – offrir, croire – Penser à, penser de – Plaire à – Les couleurs – Le masculin et le féminin des adjectifs – Les pronoms compléments directs le, la, les.

REFERENCES

1. ''Latitudes–1'' Méthode de français, REGIME MERIEUX, YVES LOISEAU Les éditions Didier, Paris, 2012.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

Subject Code	**Subject Title**	**L**	**T**	**P**	**Total of LTP**	**C**
ULE18101	**ENGLISH-I**	**4**	**1**	**0**	**5**	**4**

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	To enable the students to think in English	e	f	h	m	n
2.	To become aware of the regional literature and the writers.	e	f	d		
3.	To equip students with the awareness and strategies needed to enable the study of English as a lifelong process.	e	f	d		

UNIT– I: POETRY

1. Yayum Nyayum – Kurunthogai 40
2. My Grandmother's House – Kamala Das
3. Transgender – Olivia Kent
4. Obituary – A K Ramanujam

UNIT – II: PROSE

1. On Marriages – Nirad C Choudhary
2. Response to Welcome addresses
3. Why Do We Disagree – Swami Vivekananda
4. I have a dream – Martin Luther King

UNIT– III: SHORT STORY

1. A Nincompoop – Anton Chekhov
2. The Rat – Ashokamitran
3. Quantum of Solace – Ian Flemming
4. Squirrel – Ambai

UNIT– IV: POPULAR LITERATURE

1. Shabdo – Kaushik Ganguli
2. TEDX Talks
3. John Lennon – Imagine
4. Bob Marley – No woman no cry

UNIT – V: LANGUAGE COMPONENT

1. Spot the Errors
2. Jumbled Sentence
3. Homophones & Homonyms
4. Idioms and Phrases
5. Antonyms and Synonyms
6. Story through Images
7. Hints Development

8. Autobiography of Concrete Objects
9. Advertisements
10. Slogan Writing

TEXT BOOKS

1. Raymond Murphy, *Essential Grammar,* Cambridge University Press, 3rd Edition, 2010.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18101	**PROPERTIES OF MATTER AND ACOUSTICS**	4	**1**	**0**	**5**	**4**

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To understand the different kinds of moduli via experimental methods	**b**	**c**		**i**	
2	To understand the surface tension i.e. boundary property and viscosity	**b**	**c**		**i**	
3	To understand the wave phenomena: in General, and sound wave in particular	**b**	**c**	**e**		
4	To understand ultrasonics and acoustics	**b**	**c**		**k**	**m**

UNIT – I: ELASTICITY AND MODULI

Elasticity – Three types of elastic moduli and relation among them – Poisson's ratio and Poisson's ratio for rubber band– Bending of beams – Expression for bending moment – Depression of the loaded end of a Cantilever – Uniform – Non uniform bending – Theory – Experiment pin and microscope method – Work done in uniform bending – Koenig's method – Non–uniform bending – Theory – Expression for couple per unit twist – Determination of rigidity modulus – Static

torsion method with scale and telescope – Rigidity modulus by torsion pendulum with mass.

UNIT –II: FLUID MOTION

Viscosity – Coefficient of critical velocity – Poiseulli's formula for coefficient of viscosity and its correction – Determination of coefficient of viscosity by capillary flow method – comparison of viscosities Oswald's viscometer – Viscosity of a highly viscous liquid – Stoke's method for the Coefficient of a highly viscous liquid – Variations of viscosity with temperature and pressure – Viscosity of gases – Mayer's formula for the rate of flow of a gas through a capillary tube – Rankine's method for the determination of viscosity of a gas.

UNIT – III: SURFACE TENSION

Surface tension and Osmosis – Surface energy – Angle of contact and its determination – Excess of pressure inside curved surface – Formation of drops – Experimental study of variation of Surface tension with temperature – Drop weight method of determining surface tension and interfacial surface tension – Angle of contact of mercury – Quincke's method – Surface tension and vapour pressure osmosis – Experimental determination of osmotic pressure – Laws of osmosis pressure – Osmotic and vapour pressure of a solution.

UNIT – IV: SOUND

Sound – Definition of free, damped and forced vibrations – Theory of forced vibrations –Resonance – Sharpness of resonance – Fourier's theorem – Application for Saw– tooth wave and square wave –Sonometer – Determination of A.C. frequency using sonometer – Determination of frequency using Melde's apparatus.

UNIT – V: ULTRASOUND AND ACOUSTICS

Ultrasonics – Production – Piezo electric method – Magnetostriction method – detection – Properties – Applications. Acoustics : Intensity Level, Loudness – Acoustics of buildings – Reveberation – Reverberation time – Derivation of Sabine's formula – determination of absorption coefficient – Optimum reverberation time – Factors affecting Acoustics of buildings – Sources of noises and its control – Sound level meter.

TEXT BOOKS

1. Brijlal and Subramaniam N., *Properties of Matter*, Revised Edition, S.Chand and Company, 2005.
2. Murugesan R., *Properties of Matter and Acoustics*, Revised Edition, S.Chand and Company, 2005.

REFERENCES

1. Landau L. D., Pitaevskii L P, Kosevich A M and Lifshitz E M, *Theory ofElasticity*, Revised Edition, Butterworth–Heinemann, 2014.
2. Landau L. D., Pitaevskii L P, Kosevich A M and Lifshitz E M, *FluidMechanics*, Revised Edition, Butterworth–Heinemann, 2014.
3. Saighal R. L, *A Text Book of Sound*, 5th Edition, S. Chand and Company, 2010.
4. Mathur D. S, *Elements of Properties of Matter*, 3rd Edition, S. Chand and Company.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18102	**CLASSICAL MECHANICS AND RELATIVITY**	4	**0**	**0**	**4**	**4**
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To understand the general principles of classical mechanics and relativity	**b**	**c**			
2	To comprehend the physical concepts and mathematical methods of classical mechanics		**c**	**e**		
3	To develop skills in formulating and solving physics problems	**a**	**e**	**f**	**g**	
4	To apply the concepts of classical mechanics in real time situations	**a**	**c**		**k**	**n**

UNIT – I: MECHANICS OF SYSTEM OF PARTICLES

Mechanics of a single particle – Mechanics of system of particles– Conservation of linear momentum– Conservation of Angular momentum – Mechanical energy for a particle and a system of particles–Centre of mass and equation of motion –

Constrained motion–.Types of constraints–Forces of constraints – Principle of Virtual work – D'Alembert's principle.

UNIT – II: LAGRANGE AND HAMILTON FORMALISM

Degrees of freedom and generalized coordinates– Transformation equations– Generalized Displacement–Generalized velocity– Generalized acceleration– Generalized momentum– Generalized Force –Generalized Potential–Hamilton's Variational principle– Lagrange's equation of motion from Hamilton's principle– Linear Harmonic Oscillator–Simple pendulum–Atwood's machine.

UNIT – III: ROTATIONAL MOTION

Moment of inertia–radius of gyration– Energy and angular momentum of rotating systems of particles–Parallel and perpendicular axes theorems of moment of inertia– Moment of inertia of solid sphere –Hollow sphere–Spherical shell, solid cylinder–Rotating frames of reference – Coriolis and centrifugal forces–Force free motion of rigid bodies – free spherical top and free symmetric top.

UNIT – IV: THEORY OF RELATIVITY

Frame of reference– Limitation of Newton's law of motion– Inertial frame of reference–Galilean transformation– Frame of reference with linear acceleration– Classical relativity– Galilean invariance– Transformation equation for a frame of reference inclined to an inertial frame and rotating frame of reference–Non–inertial frames–Accelerated Frame of reference –Rotating frame of reference –Effect of centrifugal and coriolis forces due to earth's rotation– Fundamental frame of reference – Michelson– Morley's experiment–Concept of Einstein's relativity.

UNIT – V: APPLICATIONS OF THEORY OF RELATIVITY

Special theory of relativity– Lorentz co–ordinate and physical significance of Lorentz invariance– Length contraction– Time dilation– Twin paradox– Velocityaddition theorem– Variation of mass with velocity– Mass energy equivalence–Transformation of relativistic momentum and energy–Relation between relativistic momentum and energy, Mass, velocity, momentum and energy of zero rest mass

TEXT BOOKS

1. Rana N. C.and Joag P.S., *Classical Mechanics*, 1st Edition, McGraw Hill, 2011.
2. Herbert Goldstein, Charles P. Poole and John L. Safko, *Classical Mechanics*, 3rd Edition, Pearson, 2011.

REFERENCES

1. John R. Taylor, *Classical Mechanics*, 1st Edition, University Science Books, 2005.
2. David Morin, *Introduction to Classical Mechanics*, 1st Edition, Cambridge University Press, 2008.
3. Harald J. W. Muller–Kirsten, *Classical Mechanics and Relativity*, 1st Edition, World Scientific Publishing Ltd, 2008.
4. Dieter Strauch, *Classical Mechanics–An Introduction*, 5th Edition, Springer, 2009.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18103	**GENERAL PHYSICS LABORATORY–I**	**0**	**0**	**4**	**4**	2
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To gain knowledge in the scientific methods and learn the process of measuring different Physical variables	**a**	**d**	**h**	**i**	
2	To enable the student to explore the field of properties of matter	**a**		**h**	**i**	
3	To make the student understand the basic concepts in acoustics	**a**		**h**	**i**	
4	To allow the student to have a deep knowledge of the gravitational physics	**a**		**h**	**i**	**n**

List of Experiments (Any 9 Experiments)

1. Determination of Young's modulus of the material of the beam – Uniform Bending (Pin and Microscope)
2. Determination of Young's modulus of the material of the beam – Non uniform bending (Pin and Microscope)
3. Determination of Young's modulus of the material of the beam – Non Uniform Bending (Scale and Telescope)
4. Determination of Young's modulus of the material of the beam – Uniform Bending (Scale and Telescope)
5. Determination of rigidity modulus using Torsional Pendulum – Without masses
6. Determination of elastic constants of a wire by Searle's method
7. Determination of rigidity modulus using static torsion method
8. Determination of surface of the liquid–Capillary raise method
9. Determination of coefficient of viscosity of liquid–Poiseuille's flow method
10. Determination of AC frequency main using Sonometer.
11. Generation of Lissajous figure using Signal Generator.
12. Determination of acceleration due to gravity–Compound bar pendulum

TEXT BOOKS

1. R. K. Shukla & Anchal Srivastava. *Practical Physics*, New Age International (P) Ltd, Publishers, (Formerly Wiley Eastern Limited), 4835/24, Ansari Raod, Daryagani, New Delhi–11002. 2006.
2. C. L. Arora, *B.Sc., Practical Physics,* S. Chand & Company Ltd. Ram Nagar, New Delhi–110055. 2007.

REFERENCES

1. G. L. Squires, *Practical Physics*, Fourth edition, Cambridge University Press, 2001.
2. D. Halliday, R. Resnick and J. Walker, *Fundamentals of Physics*, 6th Ed., John Wiley and Sons, Inc., New York, 2001.
3. F.A. Jenkins and H.E. White, *Fundamentals of Optics*, 4th Ed., Reprint McGraw–Hill Book Co., 2007.
4. Geeta Sanon, *B. Sc., Practical Physics*, 1st Edition. R. Chand & Co, 2007.

Course nature: practical						
Assessment method-practical component (marks: 100)						
In-semester	Assessment tool	Experiments	Observation	Regularity	Model Examination	Total
	MARKS	25	10	5	10	50%
End Semester Weightage						50%
Total						100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UMA18A01	ALLIED MATHEMATICS I	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES		Student Outcomes
1.	To apply basic concepts for clear understanding of mathematical principles.	a
2.	To solve practical problems	a
3.	Improve their ability in solving applications of sets and logics	a
4.	Learning the numerical techniques by solving the theory of equations	a

UNIT – I: SETS, RELATIONS AND FUNCTIONS

Sets: sets - representation of sets - types of sets- operation on sets -Venn diagram. Relation: types of relation, equivalence relation. Function: types of functions- composite of two functions- composite of three functions

UNIT – II: MATHEMATICAL CONNECTIVES LOGIC

Statements – connectives- conjunction- disjunction- negation- tautology- contradiction- logical equivalence- tautological implications- arguments- validity of arguments – Normal forms – Principal disjunctive normal form – Principle conjunctive normal form.

UNIT – III: THEORY OF EQUATIONS

Polynomial equations - irrational roots - complex roots- (up to third order equations only) – Reciprocal equations- Approximation of roots of a polynomial equation by Newton's and Horner's methods.

UNIT – IV: MATRICES

Symmetric, skew symmetric- Hermitian- skew Hermitian – Orthogonal- Unitary matrices – Cayley Hamilton Theorem –Eigenvalues– Eigenvectors – solving the equations using Cramer's rule.

UNIT – V: DIFFERENTIATION

Simple problems only – maxima and minima of functions of single variable – Radius of curvature (Cartesian co– ordinate) – partial differentiation – Euler's theorem.

TEXT BOOKS

1. Veerarajan, T., *Discrete Mathematics*, 7th Edition, Tata–Mcgraw Hill, New Delhi, 2006.
2. Singaravelu, A., *Allied Mathematics*, 6th Revised Edition, Meenakshi Agency, Chennai, 2014.

REFERENCES

1. Vittal, P.R, *Allied Mathematics*, 4th Edition Reprint, Margham Publications, Chennai, 2013.
2. Venkatachalapathy, S.G., *Allied Mathematics*, 1st Edition Reprint, Margham Publications, Chennai, 2007.
3. Kreyszig.E, *Advanced Engineering Mathematics*, John Wiley & Sons. Singapore, 10th Edition, 2012.
4. Veerajan. T, *Engineering Mathematics I*, Tata McGraw Hill Publishing Co, New Delhi, 5th Edition, 2006.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

Subject Code	**Subject Title**	**L**	**T**	**P**	**Total**	**C**
CAC18101	**SOFT SKILLS**	**2**	**0**	**0**	**2**	**2**

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		**Student Outcomes**					
1.	To acquire inter personal skills and be an effective goal oriented team player	d	e	f	h	m	n
2.	To develop professionalism with idealistic, practical and moral values	d	e	f	h	m	n

3.	To acquire communication and problem solving skills	d	e	f	h	m	n
4.	To re-engineer their attitude and understand its influence on behavior	d	e	h			

UNIT–I: ATTITUDE

Who am I? SWOT analysis, Importance of self confidence and self esteem, Factors influencing attitude, Challenges and lessons from attitude

UNIT–II: COMMUNICATION

Practice activities (JAM, spin a story, diagram description, etc…), Activities for evaluation (Extempore, speaking news, book review)

UNIT–III: GOAL SETTING

SMART goals, Blue print for success, Short term, Long term, Life time goals, Value of time, Diagnosing time management, Prioritizing work

UNIT–IV: PUBLIC SPEAKING

Activities for evaluation (Surveying and reporting, Debate, Group discussion)

UNIT – V: CREATIVITY

Out of box thinking, lateral thinking

TEXT BOOKS

1. Covey Sean, *Seven habits of highly effective teens*, New York, Fireside Publishers, 1998.
2. Carnegie Dale, *How to win friends and influence people*, New York, Simon and Schuster, 1998.

REFERENCES

1. Thomas A Harris, *I am ok, you are ok*, New York, Harper and Row, 1972.

Course Nature : Theory (Internal)						
Assessment Method (Max.Marks: 100)						
In Semester	**Assessment Tools**	**Class Room Activities**	**Communication Activities**	**LMS**	**Participation**	**Total**
	Marks	**20**	**50**	**20**	**10**	**100**
Total						**100%**

SEMESTER II

COURSE CODE	COURSE TITLE	L	T	P	TOTAL L+T+P	C
ULT18201	தமிழ்– II	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	இரண்டாயிரம் ஆண்டுகாலத் தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப் பட்டுள்ளது.	e	f	h	m	n
2.	காலந்தோறும் தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள், அடையாளங்கள் ஆகியவற்றை காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதாகவும், மொழியின் கட்டமைப்பைப் புரிந்து கொள்வதாகவும் பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.	e	f	d		
3.	வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.	e	f	n		

பாடத்திட்டத்தின்நோக்கம்

- இரண்டாயிரம்ஆண்டுகாலத்தமிழின்தொன்மையையும்வரலாற்றையும்அதன்விழுமியங்களையும்பண்பாட்டையும்எடுத்துரைப்பதாகஇப்பாடத்திட்டம்அமைக்கப்பட்டுள்ளது.
- காலந்தோறும்தமிழ்இலக்கியம்உள்ளடக்கத்திலும், வடிவத்திலும்பெற்றமாற்றங்கள், அதன்சிந்தனைகள், அடையாளங்கள்ஆகியவற்றைகாலந்தோறும்எழுதப்பட்டஇலக்கியங்களின்வழியாகக்கூறுவதாகவும், மொழியின்கட்டமைப்பைப்புரிந்துகொள்வதாகவும்பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.
- வாழ்வியல்சிந்தனைகள், ஒழுக்கவியல்கோட்பாடுகள், சமத்துவம், சூழலியல்எனப்பலகூறுகளைமாணவர்களுக்குஎடுத்துரைக்கும்விதத்தில்இப்பாடத்திட்டம்உருவாக்கப்பட்டுள்ளது.

அலகு – 1

1. **எட்டுத்தொகை :** 1. குறுந்தொகை (பாடல்–130), 2. நற்றிணை(பாடல்–27), 3. அகநானூறு (**பாடல்** – 86)
2. **பத்துப்பாட்டு** –சிறுபாணாற்றுப்படை **(**அடிகள்– 126–143)
3. **பதினெண் கீழ்க்கணக்கு** : திருக்குறள்–வெகுளாமை (அதிகாரம்31), காதல்சிறப்புரைத்தல் (அதிகாரம் 113)

அலகு – 2

1. **எட்டுத்தொகை :** 1. ஐங்குறுநூறு(பாடல்– 203), 2. கலித்தொகை–பாலைத்திணை (பாடல்– 9), 3. புறநானூறு (பாடல்– 235)
2. **பத்துப்பாட்டு**–முல்லைப்பாட்டு (அடிகள்– 6 – 21)
3. **பதினெண்கீழ்க்கணக்கு**– 1. நாலடியார்–நல்லார்எனத்தான் (221), 2.திரிகடுகம்–கோலஞ்சிவாழும்குடியும் (33), 3. இனியவைநாற்பது–குழவிதளர்நடை (14), கார்நாற்பது – நலமிகுகார்த்திகை (26), 5. களவழிநாற்பது–கவளங்கொள்யானை (14)

அலகு– 3

சைவம் – பன்னிருதிருமுறைகள்

1. திருஞானசம்பந்தர்–வேயுறுதோளிபங்கன் (இரண்டாம் திருமுறை)
2. திருநாவுக்கரசர்– மனமெனும்தோணி (நான்காம்திருமுறை)
3. சுந்தரர் – ஏழிசையாய்இசைப்பயனாய் (ஏழாம் திருமுறை)
4. மாணிக்கவாசகர் – ஆதியும்அந்தமும்இல்லா (திருவெம்பாவை)
5. திருமூலர்–அன்பு சிவம் இரண்டு (திருமந்திரம்)

வைணவம் – நாலாயிரத்திவ்யப்பிரபந்தம்

1. பேயாழ்வார்–திருக்கண்டேன்பொன்மேனி …
2. பெரியாழ்வார்–கருங்கண்தோகைமயிற்பீலி…
3. தொண்டரடிப்பொடிஆழ்வார்–பச்சைமாமலைபோல்…
4. ஆண்டாள்–கருப்பூரம்நாறுமோ? கமலப்பூ …
5. திருமங்கையாழ்வார்–வாடினேன்வாடிவருந்தினேன்

இஸ்லாமியம்

சீறாப்புராணம்–மானுக்குப் பிணை நின்ற படலம்– 5 பாடல்கள்(பாடல்எண்கள் : 61 – 65)

கிறித்துவம்

இரட்சண்ய யாத்ரீகம் – கடைதிறப்புப்படலம் – 5 பாடல்கள் (பாடல்எண்கள் : 3,9,10,15,16)

அலகு – 4

தமிழ்இலக்கியவரலாறு

1. சங்கஇலக்கியங்கள், 2. நீதிஇலக்கியங்கள், 3.பக்திஇலக்கியங்கள், 4. காப்பியங்கள்

அலகு – 5

சிறுகதைகள்

1. புதுமைப்பித்தன் – அகலிகை
2. ந.பிச்சமூர்த்தி – வேப்பமரம்
3. அகிலன் – ஒருவேளைச்சோறு
4. ஜி. நாகராஜன் – பச்சக்குதிரை
5. கி.ராஜநாராயணன் – கதவு
6. சா.கந்தசாமி – தக்கையின்மீதுநான்குகண்கள்
7. ஆண்டாள்பிரியதர்ஷினி – மாத்திரை
8. வண்ணதாசன் – ஒருஉல்லாசப்பயணம்
9. சு. தமிழ்ச்செல்வன் – வெயிலோடுபோய்
10. பாரததேவி – மாப்பிள்ளைவிருந்து

பார்வைநூல்கள்

1. அரசு, வீ., இருபதாம்நூற்றாண்டுச்சிறுகதைகள்நூறு, அடையாளம்பதிப்பகம், திருச்சி, 2013
2. அருணாசலம், ப., பக்திஇலக்கியங்கள், பாரிநிலையம், சென்னை, 2010
3. தமிழண்ணல்,புதியநோக்கில்தமிழ்இலக்கியவரலாறு, மீனாட்சிபுத்தகநிலையம், மதுரை, 2000
4. பாக்யமேரி, வகைமைநோக்கில்தமிழ்இலக்கியவரலாறு, என்.சி.பி.எச். பதிப்பகம், சென்னை, 2011
5. பசுபதி, ம.வே. செம்மொழித்தமிழ்இலக்கணஇலக்கியங்கள், தமிழ்ப்பல்கலைக்கழகம், தஞ்சாவூர், *2010.*

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	Assessment Tool	Cycle Test I	Cycle Test II	Model Examination	Assignment	Attendance	Total
	Marks	10	10	20	5	5	50%
End Semester Weightage							50%
Total							100%

SUBJECT CODE	SUBJECT TITLE	L	T	P	Total	C
ULH 18201	HINDI-II	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	To express and communicate literature which is part of life	e	f	h	m	n
2.	To incorporate day to day personal and professionl life' s need to communicate in the language.	e	f			
3.	To help the students to imagine and express their mind through literature	e	f			

UNIT – I POETRY

1. Kabir, tulsi, rahim, bihari
2. Kaidi aur kokila – Makhan lal chaturvedi
3. Ab aur nahi – Om prakash valmiki
4. Prem ka rog – Kunwar narayan
5. Maa gaon me hai – Divik ramesh
6. Adhik naya hota hun – Liladhar mandloi

UNIT – II STORY

1. Vaishnavi – Yashpal
2. Dopahar ka bhojan – Amarkant
3. Jungle – Chitra mudgal
4. Kinare se door – Rakesh bihari
5. Precious baby – Anita nair

UNIT – III

1. Adminstrative Words, Anuvad : Anuvad Ki Parisbhasha Evam Bhed

UNIT – IV

1. Anuvad : English To Hindi

REFERENCES

1. Prayojan Mulak Hindi – Madhav Sontakke.
2. A practical guide to english translation and compostition – K.P. Thakur.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

SUBJECT CODE	**SUBJECT TITLE**	**L**	**T**	**P**	**Total**	**C**
ULF18201	**FRENCH-II**	**4**	**1**	**0**	**5**	**4**

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		**Student Outcomes**				
1.	Improve their oral and written skills through a combination of theory and practice.	**e**	**f**	**h**		
2.	Consolidate the knowledge of theoretical aspects of French grammar with examples provided from different angles: from present day literature, day to day conversation.	**e**	**f**	**m**		

Unité–I

C'est où ? – Demander et indiquer une direction – Localiser (près de, en face de,….) – L'impératif – Quelques prépositions de lieu– Les articles contractés au, à la …. – Le passé composé et l'accord du participe passé avec être –Les nombres ordinaux – Ne…plus, ne … jamais – Les adjectifs numéraux ordinaux – Faire.

Unité–II

N'oubliez pas !– Exprimer l'obligation ou l'interdit – Conseiller – En dans les constructions avec de – Quelque chose, rien – Quelqu'un, personne – Il faut, devoir –Qui, que, où – Les pronoms compléments indirects (me, te, lui, leur…). **Belle vue sur la mer !** – Décrire un lieu –Situer – se situer dans le temps – La place des adjectifs – Des, De devant un adjectif – Le genre des noms de pays – Les prépositions et les noms de villes, de pays, de continents – Tout(e) (s), tous – Y, pronoms complément – Les adjectifs démonstratifs.

Unité–III

Quel beau voyage !– Raconter – Décrire les étapes d'une action – Exprimer l'intensité et la quantité – Interroger– Les verbes pronominaux – à la pièce, au kilo – un sachet de, un litre de … –d'abord, puis … – peu, assez, trop… – En pronom complément – L'interrogation par l'inversion et révision de l'interrogation – Partir.

Unité–IV

Oh !joli !– Décrire quelqu'un – comparer – Exprimer l'accord ou le désaccord – Se situer dans le temps –L'imparfait – L'imparfait ou le passé composé – la description d'une personne.

Unité–V

Et après ?– Parler de l'avenir– Exprimer des souhaits – Décrire quelqu'un– S'en aller, partir, quitter – Les indicateurs de temps (en, dans) – Le futur simple – Le subjonctif présent– La place des pronoms à l'impératif.

Référence

1. ''**Latitudes–1''** Méthode de français, REGIME MERIEUX, YVES LOISEAU Les éditions Didier, Paris, 2012.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

SUBJECT CODE	SUBJECT TITLE	L	T	P	LTP	C
ULE18201	ENGLISH - II	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	To enable the students to think in English	e	f	h	m	n
2.	To become aware of the world literature and the writers	e	f	d		
3.	To equip students with the awareness and strategies needed to enable the study of English as a lifelong process.	e	f	d		

UNIT–I : POETRY

1. The Unknown citizen – Auden
2. Nada Kondro Kada Kondro– Pura Naanooru 187
3. On being Trans– Lee Mokobe
4. Girl Child – Pawani Mathur

UNIT–II : PROSE

1. Men and Women – Virginia Woolf
2. Farewell Speech of Mark Antony – William Shakespeare
3. The Autobiography of an unknown Indian –Nirad C.Chaudhuri

UNIT–III : SHORT STORIES AND PLAY

1. A Wrong Man in Worker's Paradise – Rabindranath Tagore
2. Refund – Karen E.Bender
3. Paper Money – Razia Fasih Ahmad
4. Karukku – Bama

UNIT– IV : POPULAR LITERATURE

1. Paul Simon –The Sound of Silence
2. Tedx Talks – If I had a daughter
3. John Lennon – I have a dream
4. Pink Floyd– Brick in the Wall

UNIT–V : LANGUAGE COMPONENT

1. Spot the Errors & Punctuation
2. Antonyms and Synonyms

3. Parts of speech
4. Articles
5. Vowels
6. Road Mapping
7. Movie Review
8. Crossword Puzzles
9. Open ended Stories
10. Quiz

TEXT BOOK

1. Cambridge University Press, Raymond Murphy, *Essential Grammar in Use* 3rd Edition 2010.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18201	**ELECTRICITY AND MAGNETISM**	4	**1**	**0**	**5**	**4**

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To understand the general concepts in Electrostatics	**b**	**c**			
2	To understand the general concepts in Magnetostatics	**b**	**c**			
3	To learn the fundamentals of electromagnetic wave theory	**b**	**e**		**k**	
4	To develop problem solving skills in Electromagnetism	**a**	**c**	**e**		

UNIT–I: BASICS OF ELECTROSTATICS

Basics of vector calculus – Definition of Gradient- Divergence and Curl- Gradient, Divergence and Curl theorems- Coulomb's law - Electric field - Electric field due to discrete and continuous charge distributions- Gauss law in integral and differential form- Applications of Gauss law for symmetric charge distributions- Electric dipole in an electric field - Torque.

UNIT–II: ENERGY IN ELECTROSTATICS

Electric potential - Calculating electric potential from electric field and vice–versa - Potential inside and outside of a spherical shell of charge - Equipotential lines and surfaces - Energy expended in moving a point charge in an electric field - Calculation of electric potential due to a system of discrete and continuous charge distributions - Potential gradient - Derivation of energy density in an electrostatic field - Potential energy of an electric dipole in an electric field.

UNIT–III: CONDUCTORS AND DIELECTRICS

Properties of conductors - Discontinuity of electric field on the surface of a conductor - Nature of dielectric materials - Definition of electric polarization - Dielectric breakdown – Capacitors - Calculating the capacitance of a parallel plate capacitor, a cylindrical capacitor - a spherical capacitor - and for an isolated spherical capacitor - Capacitor with a dielectric - Gauss's law in presence of linear dielectrics – Electric displacement.

UNIT–IV: MAGNETIC FIELDS

Motion of charged particles in magnetic fields - Magnetic force on a current carrying wire - Torque on a current loop - Magnetic dipole moment of a magnetic dipole - Biot–Savart's law - Applications of Biot–Savart's law to current carrying long straight wire and a circular arc of wire - Force between two parallel currents - Non–existence of magnetic monopoles – Maxwell's second equation - Ampere's law - Applications of Ampere's law to calculate magnetic field due to symmetric current distributions – a long straight current carrying wire - a solenoid and toroid - Equivalence of current carrying loop and a magnetic dipole - Faraday's law of induction - Lenz's law - Induction and energy transfers - Motional e.m.f - Inductance of a solenoid - Self–induction of a coil - Mutual induction- Energy stored in a magnetic field - Energy density of a magnetic field.

UNIT–V: ACCIRCUITS AND ELECTROMAGNETIC WAVES

LC oscillations - Damped oscillations in LCR circuit - Forced oscillations in LCR circuit - Displacement current - Applications of Maxwell's equations to vacuum – Derivation of electromagnetic wave equation - Poynting's theorem.

TEXT BOOKS

1. Halliday/Resnick and JearlWalker, *Principles of Physics*, 10th Edition, Wiley India Pvt Ltd, 2015.
2. Griffiths D.J., *Introduction to Electrodynamics,* 4th Edition, Prentice Hall of India, 2012.

REFERENCES

1. Laud B.B, *Electromagnetics*. 2nd Edition, New Age International Publication, 2005.
2. NavinaWadhani, *Electricity and Magnetism*, Prentice Hall of India, 2012.
3. Tiwari A.K., *Electricity and Magnetism*, S.Chand and Company, 2007.
4. Edward M Purcell, *Electricity and Magnetism,* Berkeley Physics Course, Volume 2, 2nd Edition, 2011.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18202	**ELECTRICITY AND MAGNETISM LABORATORY**	**0**	**0**	**4**	**4**	2
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To gain knowledge in the scientific methods and learn the process of measuring different Physical variables	**a**	**d**	**h**	**i**	
2	To enable the student to explore the field of electricity	**a**		**h**	**i**	
3	To make the student understand the basic concepts in magnetism	**a**		**h**	**i**	
4	To allow the student to have a deep knowledge of the fundamentals electromagnetic circuits	**a**		**h**	**i**	**n**

List of Experiments (Any 9 Experiments)

1. Calibration of voltmeter using Potentiometer
2. Calibration of ammeter using Potentiometer
3. Determination of Internal resistance of the given cell using Potentiometer.
4. Determination horizontal component of earth magnetic field–Field along the axis of the coil
5. Determination of Temperature Coefficient of Resistance using Post Office Box.
6. Determination of Magnetic moment and Ratio of magnetic moments by Searle" s Vibration magnetometer method.
7. Comparison of emf's of two cells using Ballistic Galvanometer.
8. Determination of Figure of merit of charge by Ballistic Galvanometer
9. Comparison of Capacitance of two capacitors using Ballistic Galvanometer.
10. Study of resonance in series LCR circuits.
11. EMF of a thermocouple–Potentiometer
12. Study of resonance in parallel LCR circuits.

TEXT BOOKS

1. R. K. Shukla &Anchal Srivastava. *Practical Physics*, New Age International (P) Ltd, Publishers, (Formerly Wiley Eastern Limited), 4835/24, Ansari Raod, Daryagani, New Delhi–11002. 2006.
2. C. L. Arora, *B.Sc., Practical Physics,* S. Chand & Company Ltd. Ram nagar, New Delhi–110055. 2007.

REFERENCES

1. Chattopadhyay, D., Rakshit, P. C. and Saha, B., *An Advanced Course in Practical Physics*, 8th Edition, Books & Allied Ltd., Calcutta, 2007.
2. Indu Prakash and Ramakrishna, *A Text Book of Practical Physics*, 11th Edition, Kitab Mahal, New Delhi, 2011.
3. C. Ouseph,K. Rangarajan,*A Text Book of Practical Physics*, Volume I,II, S.Viswanathan Publishers,1997.
4. GeetaSanon, *B. Sc., Practical Physics*, 1st Edition. R. Chand & Co, 2007.

Course nature: practical						
Assessment method-practical component (marks: 100)						
In semester	**Assessment tool**	**Experiments**	**Observation**	**Regularity**	**Model Examination**	**Total**
	Marks	**25**	**10**	**5**	**10**	**50%**
End Semester Weightage						**50%**
Total						**100%**

COURSE CODE	COURSE TITLE	L	T	P	LTP	C
UMA18A02	ALLIED MATHEMATICS II	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES		Student Outcomes				
1.	To apply basic concepts for clear understanding of mathematical principles.	a				
2.	To understand integral calculus	a				
3.	To solve practical problems.	a				
4.	Improve the Students knowledge for solving integration problems and their applications.	a				
5.	Improve student ability to solving Laplace transforms and applying Engineering and Science.	a				

UNIT – I : INTEGRAL CALCULUS

Integral calculus– polynomial and irrational function – Partial fraction (Simple algebraic functions only) – Bernoulli's formula – Reduction formula– $\int \sin^n x dx - \int \cos^n x dx - \int_0^{\pi/2} \sin^n x dx - \int_0^{\pi/2} \cos^n x dx$

UNIT – II : TRIGONOMETRY

Trigonometry – Expansion of $\sin n\theta, \cos n\theta$ and $\tan n\theta$ – Expansion of $\sin^n \theta$ and $\cos^n \theta$ in terms of multiples of $\sin\theta$ and $\cos\theta$.

UNIT – III : DIFFERENTIAL EQUATION

Differential Equations – Second order differential equations with constant coefficients.

Problem based on R.H.S: 0, e^{ax}, *Sin ax*, *Cos ax*, *x* .

UNIT – IV : LAPLACE TRANSFORMATION

Laplace Transformation – Basic properties and simple problems – $L[e^{at} f(t)] - L[tf(t)] - L[e^{at} tf(t)] - L[f(t)/t]$.

UNIT – V : INVERSE LAPLACE TRANSFORMATION

Inverse Laplace transformation – Simple Problems based on Inverse Laplace Transformation – Multiplied by 's'– Multiplied by '1/s'– 'Partial Fraction Method'.

TEXT BOOKS

1. Singaravelu. A, Allied Mathematics, 6th Revised Edition, Meenakshi Agency, 2014.
2. Vittal. P.R, Allied Mathematics, 4th Edition Reprint, Margham Publications, 2013.

REFERENCES

1. Venkatachalapathy, S.G,Allied Mathematics, 1st Edition Reprint, Margham Publications, 2007.
2. Manickavasagam Pillai. T.K and Narayanan. S, Ancillary Mathematics, Reprint,S.Viswanathan Printers and Publishers Pvt. Ltd.,Chennai.
3. Kreyszig.E, *Advanced Engineering Mathematics*, John Wiley & Sons. Singapore, 10th edition, 2012.
4. Veerajan. T, "*Engineering Mathematics I*", Tata McGraw Hill Publishing Co, New Delhi, 5th edition, 2006.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL L+T+P	C
UCA18E57	BASIC COMPUTER SKILLS	2	0	2	4	3

	INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:	Student Outcomes				
1.	To have an insight in to the basic computer concepts	a	b			
2.	To acquire knowledge on the storage devices	a	b			
3.	To develop skills to handle HTML	a	b	h		
4.	To perform fundamentals exercises in computer programming			i	j	k

UNIT – I: INTRODUCTION TO COMPUTER

History of development of computers – Computer system concepts – Characteristics – Capabilities and limitations – Generations of computers. – Basic components of a computer system – Control Unit, ALU, I/ O Devices, memory – RAM, ROM, EPROM, PROM, Flash Memory and other types of memory.

UNIT – II: STORAGE DEVICES

Storage fundamentals – Primary Vs Secondary – Data Storage and Retrieval methods – Sequential, Direct and Index Sequential. – Various Storage Devices – Magnetic Tape, Magnetic Disks, Cartridge Tape, Data Drives, Hard Disk Drives, Floppy (Winchester Disk), Disks, Optical Disks, CD, VCD, CD–R, CD–RW, Zip Drive, DVD, SVCD.

UNIT – III: COMPUTER SOFTWARE

Types of Software – System software, Application software, Utility Software, Demoware, Shareware, Freeware, Firmware, Free Software. – Operating Systems – Functions, Types – Batch Processing, Single User, Multi User, Multiprogramming, Multi–Tasking. –Programming languages – Machine, Assembly, High Level, 4 GL.

UNIT – IV

HTML Introduction: History of HTML – HTML Document – Anchor Tags – Hyper Links–Sample HTML Documents.HEAD AND BODY SECTIONS: Header Section – Title – Prologue – Links – Comment – Heading – Horizontal Rule – Paragraph – Images and Pictures .

UNIT – V

Ordered and Unordered List – TABLES: Table Creation – ColSpan, RowSpan – Cell Spacing, Cell Padding – Nested Tables. FRAMES: Frameset Definition – Frame Definition – Nested Frames. FORMS: Action Attribute – Method Attribute – Drop Down List – Sample Forms.

List of Experiments

1. Create a web page with necessary formats, images and marquees.
2. Create a web page with lists (Ordered, Unordered and Definition Lists).
3. Create a web page with table content.
4. Create a web page site using links for text and images.
5. Using frames, create web page for a travel agency.
6. Create a web–page using forms for our college students admission process
7. Create a web page which displays the wage of style attributes and event function with demo.

8. Create a web page which displays the mouse co–ordinates and image co–ordinates.
9. Create a web page which receives suggestions from customers for a software development and consultancy agency using necessary functions.

TEXT BOOKS

1. Rajaraman, V., *Fundamental of Computers,* New Delhi: Prentice Hall India Pvt. Limited, 2014.
2. Xavier.C,"*World Wide Web design with HTML",* Tata McGraw Hill Publishing Limited, New Delhi.

Course Nature : Theory and Practical								
Assessment Method (Max.Marks: 100) **(Fully internal)**								
In Semester	**Assessment Tool**	**Cycle Test I (Theory)**	**Cycle Test II (Theory)**	**Model Examination (Theory)**	**Evaluation of Experiments**	**Model Examination - Practical**	**Attendance**	**Total**
	Marks	15	15	**20**	20	25	5	**100%**
Total								**100%**

Subject Code	**Subject Title**	**L**	**T**	**P**	**Total of L+T+P**	**C**
CAC18201	**QUANTITATIVE APTITUDE AND LOGICAL REASONING – I**	**2**	**0**	**0**	**2**	**2**

COURSE OBJECTIVE

To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected		**Student Outcomes**						
1.	To improve aptitude, problem solving skills and reasoning ability of the students	a	b	i	j	m	n	
2.	To help them qualify the written test of competitive exams, campus placements and PSUs	a	b	i	j	m	n	
3.	To collectively solve problems in teams and groups	a	b	d	i	j	m	n
4.	To adopt new techniques in solving problem	a	b	h	i	j	m	n

UNIT – I

Numbers: Classification of numbers – Test of divisibility – Unit digit – HCF and LCM – Remainder theorem – Progression – Simplification – Averages – Combined mean (simple problems)

UNIT – II

Simple interest and compound interest – Word problems

UNIT – III

Problems related to permutation and combination – Probability (simple problems)

UNIT – IV

Reasoning (Analytical and logical): Odd man out – Word series – Number series – Direction test – Blood relationship – Coding and decoding – Seating arrangements

UNIT – V

Problems related to clocks and calendar

REFERENCES

1. Dinesh Khattar, *The Pearson guide to quantitative aptitude for competitive examinations.*
2. Dr. Agarwal.R.S,*Quantitative Aptitude for Competitive Examinations,* S.Chand and Company Limited
3. Abhijit Guha, *Quantitative Aptitude for Competitive Examinations,* Tata Mcgraw Hill, 3rd Edition
4. Edgar Thrope, *Test Of Reasoning for Competitive Examinations,*Tata Mcgraw Hill, 4th Edition

Course Nature : Theory (Internal only)							
Assessment Method (Max. Marks: 100)							
In Semester	**Assessment Tools**	**Assign ment 1**	**Assign ment 2**	**Surprise Test 1**	**Surprise Test 2**	**Attendance**	**Total**
	Marks	**20**	**20**	**25**	**25**	**10**	**100**

UNC18201/ UNS18201/ UNO18201/ UYG18201	NATIONAL CADET CORPS (NCC)/ NATIONAL SERVICE SCHEME (NSS)/ NATIONAL SPORTS ORGANIZATION (NSO) / YOGA	L	T	P	C
		0	0	0	1

PURPOSE

To imbibe in the minds of students the concepts and benefits of NCC/NSS/NSO/YOGA and make them practice the same

	INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected	Student Outcomes				
1.	To enable the students to gain knowledge about NCC/NSS/NSO/YOGA and put the same into practice		e	l	k	

SEMESTER III

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18301	HEAT AND THERMODYNAMICS	4	1	0	5	4
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To know the fundamentals of heat	b	c			
2	To understand the concepts involved in transmission of heat	b	d			
3	To understand the basic principle and laws of thermodynamics	b	c	e	f	
4	To understand the concepts of entropy	b	d			m

UNIT–I: INTRODUCTION TO HEAT

Basic Definitions – Newton's law of cooling – Specific heat of a liquid calendar and Barne's continuous flow method – Two specific heats of a gas – Specific heat of a gas by Jolly's differential steam calorimeter – Regnault's method – Dulong and Petit's law –Einstein's theory of specific heat – Debye's theory of specific heat – variation of specific heat ad atomic heat with temperature – Transference of heat.

UNIT–II: TRANSMISSION OF HEAT

Conduction – Coefficient of the thermal conductivity – Rectilinear flow of heat along a metal bar – Methods of radial flow of heat – Spherical shell method and flow of heat along the wall of a cylindrical tube – Determination of thermal conductivity of rubber and bad conductor – Lee's disc method to find thermal conductivity of bad conductor. Conduction – Radiation – Black body – Wein's Law – Raleigh Law and its significance –Jean's Law – Stefan's law – Experimental Determination of Stefan's constant – Mathematical derivation of Stefan's law.

UNIT–III: KINETIC THEORY OF GASES

Maxwell's law of distribution of molecular velocities – Experimental verification of molecular velocities – Equilibrium speed distribution of velocities – Mean free path of gaseous molecules – Transport phenomena – Diffusion of gases – Viscosity and thermal conduction of gases – Vander walls equation of state –

Determination of Vander walls constant – Comparison of vanderwall's equation with Andrews experiment – Relation between Vander Wall's constant and critical constants.

UNIT–IV: LAWS OF THERMODYNAMICS

First law of thermodynamics – Isothermal and Adiabatic process – Gas equation during an adiabatic process – Work done an adiabatic expansion of gas – Equation of an adiabatic curve – Isothermal processes – Determination of g by Clement and Desorme's method – Second law of thermodynamics – Concept of Carnot's engine– Working efficiency of Carnot's engine – Carnot's refrigerator – Carnot's Theorem and its significance.

UNIT–V: CONCEPT OF ENTROPY

Third law of thermodynamics – Concept of Entropy – Temperature entropy diagram – entropy of perfect gas – Entropy Change in entropy in a reversible process and irreversible process – temperature entropy diagram – Entropy of a perfect gas – increase of entropy in any irreversible process – Thermo dynamics functions – Maxwell's thermodynamics relations and applications – Joule Kelvin effect theory– Claussius and Clapeyron equation – Specific Heat Relation.

TEXT BOOKS

1. Brijlal, N. Subrahmanyam and P. S. Hemne,*Heat,Thermodynamics andStatistical Physics*, Revised Edition, S. Chand and Company, 2010.
2. Richard H Dittman and Zemansky MW, *Heat and Thermodynamics*, 3rd Special Edition, McGraw Hill, 2008.

REFERENCES

1. Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner and Margaret Bailey, *Fundamentals of Engineering Thermodynamics,* John Wiley and Sons, 2011.
2. D.S. Mathur, *Heat and Thermodynamics*, S. Chand and Company, 2006.
3. Kittel C and Kroemer H, *Thermal Physics,* W. H. Free man, New York, 1980.
4. Stephen Blundell and Katherine M. Blundell, *Concepts in Thermal Physics,* Oxford University Press, 2006.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	Assessment Tool	Cycle Test I	Cycle Test II	Model Examination	Assignment	Attendance	Total
	Marks	10	10	20	5	5	50%
End Semester Weightage							50%
Total							100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18302	MATHEMATICAL PHYSICS	4	1	0	5	4
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To enable students to use mathematical concepts required in physics	a	b		e	
2	To enhance problem solving skills	a	e	f		
3	To develop knowledge in mathematical physics and its application	b	c	e	f	
4	To enable students to formulate, interpret and draw inferences from mathematical solutions	b	e	f		n

UNIT–I : MATRICES AND LINEAR ALGEBRA

System of Linear Simultaneous Equations and Matrix Multiplication - Formal definition of Vector space with examples - Linear Independence, Special Matrices (symmetric, hermitian, orthogonal, unitary) – Determinant – Rank - Inverse of a Matrix - Eigen value Problem - Orthogonalization Theorem - Matrix Diagonalization - Normal Matrices - Canonical Forms - Scalar Product.

UNIT–II : DIFFERENTIAL EQUATIONS

Linear Differential Equations - Differential Equations Reducible to Linear Form - Exact Differential Equations - Integrating Factors - Change of Variables - Equations solvable for p - Equations solvable for y - Equations solvable for x - Equations that do not contain.x (or y) - Equations of the first degree in x and y – Clairauts Equation - Solution of homogeneous linear differential equations of order n with

constant coefficients - Solution of the non–homogeneous linear differential equations with constant coefficients by means of polynomial operators

UNIT –III : VECTOR CALCULUS

Vector differential calculus - gradient of a scalar field - directional derivative - divergence and curl of a vector field, line and surface integrals - Path Independence - Potential Functions and Conservative Fields - Green's theorem - Divergence theorem of Gauss - Stokes's theorem - The Frenet–Serret formulas .

UNIT –IV: COMPLEX ANALYSIS

Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions – Determination of harmonic conjugate – Milne–Thomson's method – Conformal mappings: 1/z, az , az+b and bilinear transformation.Line integral – Cauchy's integral theorem (without proof) – Cauchy's integral formulae and its applications – Taylor's and Laurent's expansions (statements only)

UNIT –V : FOURIER SERIES AND TRANSFORMS

Introduction - Periodic functions: Properties - Even & Odd functions – Properties - Special wave forms - Square wave - Half wave Rectifier - Full wave Rectifier - Sawtooth wave - Triangular wave - Euler's Formulae for Fourier Series - Fourier Series for functions of period 2π - Fourier Series for functions of period 2l - Fourier Series of a function with its periodic extension - Parseval's identity (statement only).Examples - Fourier Integral Theorem (statement only) - Fourier Transform of a function - Properties of Fourier Transform - Linearity, Shifting, Change of scale, Modulation - .Examples - Fourier Transform of Derivatives – Examples - Convolution Theorem (statement only) - Inverse of Fourier Transform,.

TEXT BOOKS

1. Satya Prakash, *Mathematical Physics*, Sultan Chand and Sons, Reprint 2016.
2. K.Ganesan, Sundarammal Kesavan, K.S.Ganapathy Subramanian &V.Srinivasan, *Advanced Calculus and Complex Analysis*, Revised Edition, 2013.

REFERENCES

1. Erwin Kreyszig*, Advanced Engineering Mathematics*, 10th Edition, Willey 2011.
2. Grewal B.S, *Higher EnggMaths*, Khanna Publications, 42nd Edition,2012.
3. Jain M C, *Vector Spaces And Matrices In Physics*, Narosa,2007.
4. Spiegel M R, Schaum's *Outline of Vector Analysis*, McGraw–Hill Education,2009.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	Assessment Tool	Cycle Test I	Cycle Test II	Model Examination	Assignment	Attendance	Total
	Marks	10	10	20	5	5	50%
End Semester Weightage							50%
Total							100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18303	THERMAL PHYSICS LABORATORY	0	0	4	4	2

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To gain knowledge in the scientific methods and learn the process of measuring different Physical variables	a	d	h	i	
2	To enable the student to explore the field of thermal physics	a		h	i	
3	To make the student understand the basic concepts in heat conductors	a		h	i	
4	To allow the student to have a deep knowledge in the field of latent heat	a		h	i	n

List of Experiments (Any 9 Experiments)

1. Determination of Thermal conductivity of a good conductor using Forbes method.
2. Determination of Specific heat capacity of a solid by Method of mixtures. (Half time correction).
3. Determination of Thermal conductivity of a bad conductor using Lee's disc method.
4. Calculate the Temperature coefficient of resistance of the given coil by Carey Foster Bridge.
5. Determination of saturated vapour pressure of water at different temperatures using Joly's method.
6. Determination of thermal conductivity of good conductors by Searle's method.

7. Determination of Specific Heat Capacity of the liquid using Joule's calorimeter.
8. Determination of Specific Heat Capacity of the liquid using Newton's Law of Cooling
9. Determination of specific heat capacity of a liquid by continuous flow (Callender and Barnes) method.
10. Determination of resistivity and band gap for a semiconductor material using P. O. Box method
11. Determination of resistivity and band gap for a semiconductor material using Fourprobe method
12. Determination of dielectric constant for a given material.

TEXT BOOKS

1. R. K. Shukla &Anchal Srivastava. *Practical Physics*, New Age International (P) Ltd, Publishers, (Formerly Wiley Eastern Limited), 4835/24, AnsariRaod, Daryagani, New Delhi–11002. 2006.
2. C. L. Arora, *B.Sc., Practical Physics,* S. Chand & Company Ltd. Ram nagar, New Delhi–110055. 2007.

REFERENCES

1. Chattopadhyay, D., Rakshit, P. C. and Saha, B., *An Advanced Course in Practical Physics*, 8thEdition, Books & Allied Ltd., Calcutta, 2007.
2. Indu Prakash and Ramakrishna, *A Text Book of Practical Physics*, 11th Edition, Kitab Mahal, New Delhi, 2011.
3. C.Ouseph,K.Rangarajan,*A Text Book of Practical Physics*, Volume I,II,S.Viswanathan Publishers,1997
4. GeetaSanon, *B.Sc., Practical Physics*, 1st Edition. R. Chand & Co, 2007.

Course nature: practical						
Assessment method-practical component (marks: 100)						
In-semester	**Assessment tool**	**Experiments**	**Observation**	**Regularity**	**Model Examination**	**Total**
	Marks	**25**	**10**	**5**	**10**	**50%**
End Semester Weightage						**50%**
Total						**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UCY18A01	ALLIED CHEMISTRY-I	4	0	0	4	4

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	To gain knowledge on the importance of basic organic chemistry.	b	c			
2.	To acquire knowledge about hydrocarbon and their reactions.		c	d	e	
3.	To promote the importance of silicon and metals.		c	g	h	
4.	To acquire knowledge in chemical kinetics and photochemistry.		c	d	e	

UNIT– I: INTRODUCTION OF HYBRIDISATION AND ISOMERISM

Hybridisation –sp, $sp^2$and sp^3–Bond length– bond angle– dipole moment– inductive effect–mesomeric effect and hyperconjucation –Isomerism–geometrical and optical isomerism– optical activity– asymmetry– dissymmetry, elements of symmetry– R, S notations.

UNIT–II: HYDROCARBONS

Methods of preparation of alkanes, properties –Reactions. Free radical mechanism of halogention of alkanes, Methods of preparation of alkenes – Stereochemistry of dehydrohalogenation (E1, E2, E1CB mechanism). Properties of alkenes –Electrophilic and nucleophilic addition mechanisms.

UNIT– III: CHEMISTRY OF HYDROGEN, SILICON AND METALS

Occurrence– extraction and chemical properties of iron– cobalt– nickel and copper.Position of hydrogen in periodic table– atomic hydrogen and isotopes of hydrogen.Preparation and structure of borazole – SiO_2, SiC and $SiCl_4$.

UNIT– IV: CHEMICAL KINETICS

Rate of reaction, order– molecularity, first order rate law and simple problems– Half–life periodof first order reaction– pseudo first order reaction– zero and second order reactions. Arrheniusand collision theories.

UNIT–V: INDUSTRIAL CHEMISTRY

Industrial Chemistry: Fuel gases–Water gas– producer gas– LPG gas–Gobar gas and natural gas. Fertilizers–NPK and mixed Fertilizers–soaps and detergents.

Pesticides: Dichloromethane– chloroform– carbon tetrachloride– DDT and BHC. Types of solvents: –Polar, Non polar.

TEXT BOOKS

1. B.R. Puri, L.R.Sharma,K.K. Kalia, Principles of Inorganic Chemistry, ShobulalNagin Chand and Co, 2001.
2. P. L.Soni, A Textbook of Inorganic Chemistry,Sultan Chand and Co., 1977.

REFERENCES

1. R. Gopalan, *Text Book of Inorganic Chemistry*, 2nd edition, Hyderabad, Universities Press, (India), 2012.
2. R.T. Morrison and R.N.Boyd, S. K. Bhattacharjee, *Organic Chemistry*, 7th edition, Pearson India, 2011.
3. B.R. Puri, L.R.Sharma and M.S. Pathania, *Principles of Physical Chemistry*, 35th edition, New DelhiShobanLalNagin Chand and Co, 2013.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UCY18A02	**ALLIED CHEMISTRY PRACTICALS-I**	**0**	**0**	**3**	**3**	**2**

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		**Student Outcomes**				
1.	To gain knowledge on the importance of basic acidimetry.	**b**	**c**			
2.	To acquire knowledge about permanganametry.			**e**	**g**	**h**
3.	To understand the importance of dichrometry.			**g**	**h**	**m**
4.	To acquire knowledge in iodimetry.		**c**	**d**	**e**	**g**

Volumetric ANALYSIS

Acidimetry and Alkalimetry

1) Estimation of HCl using standard oxalic acid
2) Estimation of NaOH using standard sodium carbonate

Permanganametry

1) Estimation of FAS using standard oxalic acid
2) Estimation of KMnO4using standard potassium dichromate

Dichrometry

1) Estimation of $FeSO_4$using standard FAS.

Complexometric or Edta Titration

1) Estimation of Zn/Mg

Iodimetry

1) Estimation of ascorbic acid
2) Estimation of phenol / aniline

TEXT BOOKS

1. V.Venkateswaran, R.Veeraswamy, A.R.Kulandaivelu, *Basic Principles of Practical Chemistry*, 2nd Edition,SultanChand and Sons, 1997.
2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith, A.R. Tatchell, *Vogel's Text Book of PracticalOrganic Chemistry*,5th edition, Pearson Education, 2005.

REFERENCES

1. Sundaram, Krishnan, Raghavan, *Practical Chemistry* (Part II), S. Viswanathan Co. Pvt.,1996.
2. N.S. Gnanapragasam and G.Ramamurthy, *Organic Chemistry – Lab Manual*, S. Viswanathan and Co., 1998.
3. J.N. Gurtu and R. Kapoor, *Experimental Chemistry*, S.Chand and Co, 1987.
4. Mendham, J. *Vogel's Quantitative Chemical Analysis*, Pearson, 2009.

COURSE NATURE: PRACTICAL						
Assessment Method-Practical Component (Marks: 100)						
In-semester	**Assessment tool**	**Experiments**	**Observation**	**Regularity**	**Model Examination**	**Total**
	MARKS	**25**	**10**	**5**	**10**	**50%**
End Semester Weightage						**50%**
Total						**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18S01	ELECTRONIC INSTRUMENTATION	0	1	2	3	2

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	Understand and learn the different principles and instruments adopted for measurement of current, voltage, power, energy.	a	d	h	i	
2	To understand various methods available for measurement of passive elements like resistance, inductance and capacitance	a		h	i	
3	To allow the student to have a deep knowledge of the fundamentals of Electronic Instrumentation	a		h	i	
4	To make the student have an deep insight on the techniques involved in experiments	a		h	i	n

List of Experiments (Any 9 Experiments)

1. Study and operation of Multimeters (Analog and Digital), Function Generator, Regulated Power Supplies.
2. Study and Operation of CRO
3. Design of multi range ammeter and voltmeter using galvanometer.
4. Study the generation of Lissajous figures to find unknown frequency and phase shift
5. Measurement of resistance by Wheatstone bridge and measurement of bridge sensitivity.
6. Measurement of Capacitance by de'Sautys.
7. Measure of low resistance by Kelvin's double bridge
8. Study of R, L, C and Q meter.
9. Measurements of L, C, R using bridges.
10. Study of Universal Counter
11. Frequency measurement using Wein Bridge.
12. RC Phase Shift Oscillator using Transistors

TEXT BOOKS

1. H. S. Kalsi, Electronic Instrumentation, Tata McGraw Hill, 2006
2. S. Wolf and R. F. M. Smith, Student Reference Manual for Electronic Instrumentation *Laboratories*, Pearson Education, 2004

REFERENCES

1. C. S. Rangan, G. R. Sarma and V. S. Mani, *Instrumentation Devices and Systems*, Tata Mcgraw Hill, 1998
2. W.D. Cooper and A. D. Helfrick, Electronic Instrumentation and Measurement Techniques, Prentice Hall, 2005
3. A. K. Sawhney, Electrical and Electronics Measurements and Instrumentation, DhanpatRai and Sons, 2007
4. R. A. Witte, Electronic *test instruments: Analog and digital measurements,* Tata McGraw Hill, 2004

COURSE NATURE: PRACTICAL				
Assessment Method-Practical Component (Marks: 100)				
In-semester	**Assessment tool**	**Experiments**	**Model Examination**	**Viva - Voce**
	MARKS	**70**	**20**	**10**
Total				**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18S02	**WORKSHOP PRACTICE**	0	1	2	3	2
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To familiarize with the basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy	**a**	**d**	**h**	**i**	
2	To familiarize with the production of simple models in the above trades	**a**		**h**	**i**	

3	To have an hands on experience of the instruments in workshop	**a**		**h**	**i**	
4	To understand the principle behind the working of equipments	**a**		**h**	**i**	**n**

List of Experiments. (Any 9 experiments)

1. Step fitting of two metal plates using fitting tools.
2. Drilling & Tapping for generating hole and internal thread on a metal plate.
3. Simple turning of cylindrical surface on MS rod using lathe machine tool.
4. Plumbing of bathroom/kitchen fitting using various plumbing components and tools.
5. Butt joint of two metal plates using arc welding process.
6. Lap joint of two metal plates overlapping on one anotherusing arc welding process.
7. T–joint of a metal plate at perpendicular direction overanother plate using arc welding process.
8. MIG welding of metal plates.
9. Cross halving joint of two wooden pieces at perpendiculardirection.
10. Dovetail halving joint of two wooden pieces in the shape ofdovetail.
11. To make circular shapes, grooving in wood piece usingwood turning lathe.
12. To make duster from wooden piece using carpentry tools.
13. To make rectangular shaped tray using GI sheet.
14. To make geometrical shape like frustum, cone and prismsusing GI sheet.
15. To make bigger size scoop using GI sheet.
16. To forge chisel from MS rod using black smithy.

REFERENCES

1. Kannaiah.P and Narayanan.K.C, "*Manual on Workshop Practice*", Scitech Publications, Chennai, 1999.
2. Gopal.T.V, Kumar.T, and Murali.G, "*A first course on workshop practice*, Theory, Practice *and WorkBook*", Suma Publications, Chennai, 2005.

COURSE NATURE: PRACTICAL				
Assessment Method-Practical Component (Marks: 100)				
In-semester	**Assessment tool**	**Experiments**	**Model Examination**	**Viva - Voce**
	MARKS	**70**	**20**	**10**
Total				**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18S03	COMPUTER PROGRAMMING(MATLAB/PYTHON)	0	1	2	3	2

	INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:	Students Outcomes				
1	To familiarize with the basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy	a	d	h	i	
2	To familiarize with the production of simple models in the above trades	a		h	i	
3	To have an hands on experience of the instruments in workshop	a		h	i	
4	To understand the principle behind the working of equipments	a		h	i	n

List of Experiments (Any 9 Experiments)

1. Finding roots of quadratic equation.
2. Calculation of youngs modulus, rigidity modulus of different materials.
3. Calculation of position, velocity, and acceleration for harmonic oscillator versus time.
4. Three dimensional motion of a charged particle in combined electric and magnetic field.
5. Symmetric top simulation.
6. Programs related to optics: Brewster's angle, Malus law and Snell's law.
7. Generation of saw tooth, triangular, and square waves.
8. Simulation of efficiency of Carnot's cycle.
9. Solving differential equations using Runge–Kutta method.
10. Biot–Savart law: magnetic field of a straight line.
11. Waves propagating on a string with fixed ends.
12. Simple pendulum using Euler method.
13. Simulation of earth orbit around the sun.
14. Calculation of speed of sound in different materials and plotting of results.
15. Students shall be encouraged to form groups (Maximum 3) to do a mini Project based on their programming skills and knowledge.

TEXTBOOKS

1. Bansal R.K, Goel A.K.,Sharma M.K., *MATLAB and its Applications in Engineering*, Pearson Education, 2012.
2. Nicholas J. Giordano, and Hisao Nakanishi, *Computational Physics*, Second Edition, Pearson/Prentice Hall, 2006.

REFERENCES

1. Guido Van Rossum, Fred. L. Drake *Introduction to Python* – Network Theory Limited – March 2011.
2. Alex Martelli *Python in a Nutshel*'– O'Reilly – 2nd Edition, 2006.
3. John M. Zelle, *Python Programming: An Introduction to Computer Science*, Second Edition, Franklin, Beedle & Associates Inc, 2010.

Course Nature: Practical				
Assessment Method-Practical Component (Marks: 100)				
In-Semester	**Assessment Tool**	**Experiments**	**Model Examination**	**Viva-Voce**
	MARKS	**70**	**20**	**10**
Total				**100%**

Subject Code	**Subject Title**	**L**	**T**	**P**	**Total of L+T+P**	**C**
CAC18301	**QUANTITATIVE APTITUDE AND LOGICAL REASONING – II**	**2**	**0**	**0**	**2**	**2**

COURSE OBJECTIVE

To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		**Student Outcomes**						
1.	To improve aptitude, problem solving skills and reasoning ability of the student	a	b	i	j	m	n	

2.	To help them qualify the written test of competitive exams, campus placements and PSUs	a	b	i	j	m	n	
3.	To collectively solve problems in teams and group	a	b	d	i	j	m	n
4.	To adopt new techniques in solving problem	a	b	h	i	j	m	n

UNIT – I

Percentage – Profit or loss – Discount

UNIT – II

Ratio, proportion – Mixtures and solutions

UNIT – III

Time and work – Time, Speed and distance; Problems related to pipes and cisterns, Problems related to train, Problems related to boats and streams, Problems related to races

UNIT – IV

Set theory – Geometry and mensuration – Cubes

UNIT – V

Data sufficiency – Data interpretation

TEXT BOOKS

1. Dinesh Khattar, *The Pearson Guide to QUANTITATIVE APTITUDE for competitive examinations.*
2. Dr. Agarwal.R.S, *Quantitative Aptitude for Competitive Examinations*, S.Chand and Company Limited

REFERENCES

1. Abhijit Guha, *Quantitative Aptitude for Competitive Examinations*, Tata Mcgraw Hill, 3rd Edition
2. Edgar Thrope, *Test of Reasoning for Competitive Examinations*, Tata Mcgraw Hill, 4th Edition

Course Nature : Theory (Internal only)							
Assessment Method (Max.Marks: 100)							
In Semester	Assessment Tools	Assignment 1	Assignment 2	Surprise Test 1	Surprise Test 2	Attendance	Total
	Marks	20	20	25	25	10	100
Total							100%

SEMESTER IV

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18401	QUANTUM MECHANICS	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To understand wave–particle duality and Heisenberg Uncertainty	b	c			
2	To understand the postulates of Quantum Frame Work	b	c	e		
3	To apply the Schrodinger wave equation to different problems	b	c	e	f	
4	To develop the understanding and application of Quantum Mechanics in modern physics.	b	e	f		n

UNIT –I :WAVE NATURE OF MATTER

Inadequacy of classical mechanics – Black body radiation – Quantum theory – Photo electric effect –Compton effect –Wave Particle Duality – Expressions for de–Broglie wavelength – Davisson and Germer's experiment – G.P. Thomson experiment – Phase and group velocity and relation between them – Wave packet – Heisenberg's uncertainity principle – Its consequences (free electron cannot reside inside the nucleus and gamma ray microscope).

UNIT –II :POSTULATES OF QUANTUM MECHANICS

Basic postulates of quantum mechanics– Schrodinger's equation – Time Independent –Time Dependent – Properties of wave function.

Operator formalism: Eigen values and Eigen functions – Energy – Momentum and Hamiltonian Operators – Hermitian operator (definition and examples).

Interpretation of Wave Function– Probability Density and Probability – Conditions for Physical Acceptability of Wave Function – Normalization – Orthogonality – Linearity and Superposition Principles – Expectation Values – Wave Function of a Free Particle.

UNIT –III : QUANTUM MECHANICS IN ONE DIMENSION

Free Particle Solution and Plane Wave Normalization – Particle in a box of length L – Energy Eigen value and normalized Eigen function.

Barrier penetration problems: Finite potential well – Tunnel effect – Scanning Tunneling Microscope (Principle and Working)

Simple Harmonic Oscillator: Classical picture of Harmonic Oscillator – Quantum Harmonic Oscillator wave function – Energy levels – Zero point energy.

UNIT –IV : QUANTUM THEORY OF HYDROGEN–LIKE ATOMS

Schrödinger's Equation for the Hydrogen Atom (Spherical Polar Coordinates) – Separation of Variables–**Quantum Numbers**: Principle –Orbital and Magnetic – shapes of the probability densities for ground states– Radiative Transitions and selection rules.

UNIT –V : EFFECTS OF FIELDS ON ATOMS

Electron angular momentum– Space quantization–Electron Spin and Spin Angular Momentum– Larmor's Theorem–Pauli Exclusion Principle – Symmetric and Antisymmetric Wave Functions–Spin Magnetic Moment and Energy– Stern–Gerlach Experiment – Normal Zeeman Effect – Magnetic dipole moment and energy – spin–orbit coupling and Energy – Lande' g–factor – qualitative discussion of Fine structure – Total angular momentum –L–S and J–J couplings (basic concept only).

TEXT BOOKS

1. ArthurBeiser, Concepts of Modern Physics, 6th Edition, McGraw Hill Education, 2009.
2. Robert Eisberg and Robert Resnick, Quantum Physics, Wiley, 2nd Edition, 2002.

REFERENCES

1. David J. Griffiths,*Introduction to Quantum Mechanics*, 2nd Edition, Pearson Publication, 2009.
2. Merzbacher E.,*Quantum Mechanics*, 3rd edition, Wiley Publishing, 1998.
3. Leonard I Schiff: *Quantum Mechanics*, 3rd Edition, McGraw Hill Book Company, 1968.
4. Thankappan V.K.,*Quantum Mechanics*, 2nd Edition, New Age International (P) Ltd, 1996.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18402	MODERN OPTICS	4	0	0	4	4
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				Students Outcomes		
1	To understand the concept of basic optics	b	c			
2	To understand the concept of Interference	b	c	f		
3	To study the fundamentals of diffraction	b	c	e	f	
4	To apply the concept of optics in holography and fiber optics	b	e	f		m

UNIT –I: INTRODUCTION TO OPTICS

Huygen's principles and its applications – Lissajous figures – Generation – Application–Fermat's Principle, verification of laws of reflection and refraction, Matrix methods refraction and translation, translation matrix, refraction matrix, system matrix, position of the image plane, magnification, system matrix for thick lens, system matrix for thin lens.

UNIT –II: INTERFERENCE

Interference by division of wavefront, Superposition of two sinusoidal waves, Interference, coherence ,conditions for interference, the inference patterns, intensity distribution .Fresnel's two mirror arrangement, FresnalBiprism, Determination of λ and dλ of Sodium Light

Interference by division of amplitude: Interference by a plane film illuminated by a plane wave, cosine law, non–reflecting films (the subsections excluded), interference by a film with two nonparallel reflecting surfaces, colours of thin films, Newton's rings, The Michelson interferometer, white light fringes

UNIT –III: DIFFRACTION

FraunhoferDiffaraction: Preliminaries, single slit diffraction pattern, diffraction by circular aperture, limit of resolution, two slit Fraunhofer diffraction pattern, N slit diffraction pattern, plane diffraction grating, resolving power.

Fresnel Diffraction: Prelimanaries, Fresnal half period zones, explanation of rectilinear propagation of light, zone plate, diffraction at straight edge

UNIT –IV: POLARIZATION AND HOLOGRAPHY

Double refraction – Nicol prism – polarizer and analyzer, Hygiene's explanation of double refraction, positive and negative uniaxial crystals, quarter and half wave

plates, types of polarized light, production and analysis of plane, circularly and elliptically polarized light, optical activity. Principles of holography, Theory of construction and reconstruction, Hologram, Applications of Holography.

UNIT –V: FIBER OPTICS

Fiber Optics: Total internal reflection, optical fiber (step and multi–mode), Numerical aperture, attenuation in optical fiber, multimode fibers, pulse dispersion, power law profile, fiber optic sensors.

TEXT BOOKS

1. AjoyGhatak, *Optics*, Mc Graw Hill, 2010.
2. Subramaniam,Brijlal and Avadhanulu, *A Text book ofOptics*, S. Chand, 2006

REFERENCES

1. Eugene Hecht, *Optics*, 4thEdition, Addison Wesley, 2002.
2. Brooker, Geoffrey, *Modern Classical Optics*, Oxford Univ. Press, 2003.
3. Guenther, Robert D and Robert Guenther, *Modern Optics*, Vol. 1. Wiley, 1990.
4. F. Jankins and H White, *Fundamentals of Optics,* Mc Graw Hill, 2017

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18403	**ADVANCED OPTICS LABORATORY**	**0**	**0**	**4**	**4**	**2**

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				**Students Outcomes**		
1	To gain knowledge in the scientific methods and learn the process of measuring different Physical variables	**a**	**d**	**h**	**i**	
2	To enable the student to explore the field of optics	**a**		**h**	**i**	

3	To make the student understand the basic concepts in spectroscopy	**a**		**h**	**i**	
4	To enhance the students understand the concepts in modern optics and laser technology	**a**		**h**	**i**	**n**

List of Experiments (Any 9 Experiments)

1. Determination of wave lengths of mercury spectrum using prism in minimum deviation
2. Determination of wave lengths of mercury spectrum using diffraction grating in minimum deviation
3. Determination of wave lengths of mercury spectrum using diffraction grating in normal incidence
4. Determination of dispersive power of a prism using spectrometer
5. Determination of refractive index of the material of the prism by drawing the i–d curve
6. Spectrometer – Narrow angled prism
7. Spectrometer – refractive index of the liquid
8. Spectrometer– i – i' curve
9. Spectrometer – Cauchy's constants
10. Determination of wavelength of sodium light – Newton's Rings
11. Determination of thickness of thin wire–Air Wedge.
12. Determination of numerical aperture and acceptance angle of the optical fiber using laser

TEXT BOOKS

1. S. K. Gupta, *Engineering Physics Practical*, Ninth Edition, Krishna Prakashan Media publishers, 2010.
2. C. L. Arora, B.Sc., Practical Physics, S. Chand & Company Ltd. Ram nagar, New Delhi–110055. 2007.

REFERENCES

1. Callister, Jr. W.D. *Materials Science and Engineering*: An Introduction, Seventh Edition, Wiley, New York, 2007.
2. S.O. Kasap, *Principles of Electronic Materials and Devices*, Tata McGraw Hill Edition, New Delhi, 2002.
3. Sam Zhang, *Materials Characterization Techniques*, CRC Press, 2008.
4. Chaikin, Paul M., and Tom C. Lubensky. *Principles of condensed matter physics*.Vol. 1. Cambridge university press, 2000.

COURSE NATURE: PRACTICAL						
Assessment Method-Practical Component (Marks: 100)						
In-semester	Assessment tool	Experiments	Observation	Regularity	Model Examination	Total
	MARKS	25	10	5	10	50%
End Semester Weightage						50%
Total						100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UCY18A03	ALLIED CHEMISTRY-II	4	0	0	4	4

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	To gain knowledge on the importance of basic organic chemistry	b	c			
2.	To acquire knowledge about coordination compounds		c	d	e	
3.	To promote the importance of industrial chemistry		c	g	h	
4.	To acquire knowledge in phase rule, adsorption and fundamentals in electrochemistry		c	d	e	

UNIT–I: CARBOHYDRATES, BENZENE AND HETEROCYCLIC COMPOUNDS

Classification of carbohydrates–Properties and uses of glucose and fructosemutarotation – Chemistry of benzene – Preparation, mechanism of electrophillic substitution reactions. Heterocyclic compounds– Preparation and properties of pyrrole and pyridine.

UNIT–II: COORDINATION CHEMISTRY

Nomenclature and isomerism of coordination compounds. EAN rule – VB and Crystal field theories of octahedral, tetrahedral and square planar complexes. Chelation and its industrial applications.

UNIT –III: INDUSTRIAL CHEMISTRY

Hardness of water – Temporary and permanent hardness, disadvantages of hard water Boiler scales and sludges – Softening of hard water – Zeolite process – demineralization process and reverse osmosis – Purification of water for domestic use: use of chlorine, Ozone and UV light.

UNIT– IV: PHASE RULE AND ADSORPTION

Phase rule– Definition of terms involved. phase diagram of H_2O, Pb–Ag - Adsorption – Langmuir adsorption isotherms – Principles of chromatography (Paper, TLC and column).

UNIT –V: ELECTROCHEMISTRY

Faradays laws of electrolysis – Specific conductance, equivalent conductance – Cell constant – Arrhenius theory Ostwald" s dilution law and Kohlrausch law – Nernst equation – Applications of EMF– Measurements.

TEXT BOOKS

1. Puri B.R., Sharma L.R., Kalia K.K., *Principles of Inorganic Chemistry*, ShobulalNagin Chand and Co, 2001.
2. R. Gopalan, S. Sundaram, *Allied Chemistry*, Sultan Chand and Sons, 1995.

REFERENCES

1. B.S. Bahl and ArunBahl, *A Text book of Organic Chemistry*, 21st Edition, Sultan Chand and Co., 2012.
2. I.L. Finar, *Organic Chemistry*, Vol 1&2, 6th edition England, Addison Wesley, Longman Ltd, 1996.
3. P.W. Atkins, *Physical Chemistry*, 5thedition, Oxford University Press, 1994.
4. M.J.Sienko and R.A.Plane, Chemistry: *Principles and properties*, InternationalStudent Edition, 1995.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UCY18A04	ALLIED CHEMISTRY PRACTICALS-II	0	0	3	3	2

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	To get a good exposure to the basic concepts of chemistry.	b	c			
2.	To enable the students to acquire quantitative skills in volumetric analysis.			e	g	h
3.	To learn the fundamentals of conductometric and potentiometric titrations.			g	h	m
4.	To understand the method of determination of molecular weight by viscosity average method.		c	d	e	g

List of Experiments

1. Estimation of $KMnO_4$ using standard Oxalic Acid
2. Estimation of $K_2Cr_2O_7$ using decinormal solution of Sodium thiosulphate solution
3. Estimation of Copper using decinormal solution of Potassium dichromate solution
4. Estimation of Nickel using decinormal solution of EDTA
5. Determination of Molecular Weight of a Polymer
6. Conductometric Titrations –I (HClvsNaOH)
7. Conductometric Titrations– II (KClvs $AgNO_3$)
8. Potentiometric Titration (Redox Titrations)

TEXT BOOKS

1. V.Venkateswaran, R. Veeraswamy, A.R.Kulandaivelu, Basic Principles of Practical Chemistry, 2nd Edition Sultan Chand and Sons,1997.
2. Daniels et al., Experimental Physical Chemistry, 7th edition, New York, McGraw Hill, 1970.

REFERENCES

1. N.S. Gnanapragasam and G.Ramamurthy, *Organic Chemistry* – Lab Manual, S. Viswanathan and Co., 1998.
2. A.Findlay, *Practical Physical Chemistry*, 7th Edition, London, Longman, 1959.
3. V.K.Ahluwalia, S.Dingra, and A.Gulati, *College Practical Chemistry*, Orient Longman Pvt. Ltd., Hyderabad, 2005.

4. K.K. Sharma and D.S. Sharma, *Introduction to Practical Chemistry*, Vikas Publishing House, New Delhi, 2005.

COURSE NATURE: PRACTICAL						
Assessment Method-Practical Component (Marks: 100)						
In-semester	**Assessment tool**	**Experiments**	**Observation**	**Regularity**	**Model Examination**	**Total**
	MARKS	**25**	**10**	**5**	**10**	**50%**
End Semester Weightage						**50%**
Total						**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18C01	**ELEMENTS OF EARTH SCIENCE**	3	**0**	**0**	**3**	**3**
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To understand the basic laws governing the earth's energy.	**b**	**c**			
2	To understand the different processes of earth atmosphere interactions.	**b**	**c**	**e**		
3	To understand the role of aerosols in energy budget.	**b**	**c**		**f**	
4	To have over all idea on climate change concepts.	**b**	**e**	**f**		**l**

UNIT – I : SOLAR SYSTEM AND EARTH ATMOSPHERE

Kepler's Laws of Planetary Motion – Structure - composition and atmosphere of our solar system (all nine planets) - Solar Energy - Solar constant - solar radiation at the Earth's surface - earth energy budget - Composition of earth atmosphere - layers of the atmosphere and Vertical structure of atmosphere - global air circulation

UNIT – II :AIR TEMPERATURE, HUMIDITY AND CONDENSATION

Daily temperature variations - day time warming - night time cooling - the controls of temperature - Circulation of water in the atmosphere – evaporation - condensation and saturation – Humidity - vapour pressure - relative humidity and dew point

UNIT – III :CLOUDS AND PRECIPITATION

Classification of clouds - cloud identification - clouds with vertical development - Atmospheric stability - unstable air - conditionally unstable air - convection and clouds - precipitation processes and precipitation types

UNIT – IV :AEROSOLS

Various aerosol sources - formation processes and types of aerosols - background of marine aerosols - sulphur cycle and sulphate aerosols - dust aerosols - carbon aerosols - urban aerosols - volcanic aerosols - high latitude atmospheric aerosols - global spatial and temporal variability of aerosols - Interaction between aerosols and minor gas components - photochemical processes with the participation of aerosols

UNIT – V :CLIMATE CHANGE

Earth's changing climate - climate during last 100 years - possible causes of climate change - climate change and variations in earth's orbit - climate change and atmospheric particles - carbon dioxide - greenhouse gas effect and global warming.

TEXT BOOKS:

1. C. Donald Ahrens and Brooks/Cole,*Essentials of Meteorology*, Cengage Learning, 2008
2. Kirill yakondratyev et al,*Atmospheric aerosol properties*, Praxiz Publishing Springer, 2006

REFERENCES :

1. Chandrasekhar A., *Basics of Atmospheric Science*, PHI Learning Private Limited, 2010.
2. MurrySalby, *Fundamentals of Atmospheric Physics*, Academic Press, 1996.
3. David G Andrews,*An Introduction to Atmospheric Physics*, 2nd Edition, Cambridge University Press, 2010.
4. John T Houghton, *The Physics of the Atmospheres*, Cambridge University Press, 2009.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18C02	SOLAR TECHNOLOGY	3	0	0	3	3

	INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:	Students Outcomes				
1	To learn the fundamentals of Solar Energy Technologies	a	b			
2	To learn the Solar thermal based energy systems	b	c	e		
3	To learn basic principles and applications of Photovoltaic systems	b	c		f	H
4	To learn solar passive architecture	b		f		

UNIT –I : SOLAR RADIATION AND COLLECTORS

Energy emitted by sun and energy that reaches the earth – Sun–Earth geometry– Solar angles – Angles of incidence– Zenith angle – Azimuthal angle – Hour angle – Latitude and longitude – Solar Spectrum and Solar constant – Extraterrestrial characteristics – Measurement and estimation on horizontal and tilted surfaces – Solar Collector Basics – Flat plate collector – Evacuated tubular collectors – Concentrator collectors – Tracking systems – Compound parabolic concentrators – Parabolic trough concentrators – Concentrators with point focus.

UNIT –II :SOLAR THERMAL TECHNOLOGIES

Solar heating and cooling system – Principle of working – Types – Design and operation – Thermal Energy storage – Types of thermal Energy Storage systems – Sensible Heat Storage – Liquids – Latent heat Storage –Thermo chemical storage – Solar thermal power plant – Solar Desalination – Solar cooker – Domestic – Community – Solar pond technology – Principle of working and description – Solar drying.

UNIT –III :SOLAR PV FUNDAMENTALS

Semiconductor – Properties – Energy levels – P–N junction – Homo and hetro junctions – P–N junction – Equilibrium condition – Non equilibrium condition – Basic Silicon Solar cell – Crystalline and multicrystalline – Dark and illumination characteristics – Efficiency limits – Variation of efficiency with band gap and temperature – Beyond single junction Efficiency Limit – Efficiency measurements– GaAs Solar cells.

UNIT –IV : SPV SYSTEM DESIGN AND APPLICATIONS

Photovoltaic cell – Photovoltaic module – PV array – Solar cell array designconcepts – PV system design – Maximum power points tracking – Storage autonomy – Centralized and decentralized SPV systems – Stand alone – Hybrid and Grid connected system – System installation – Operation and maintenances – Field experience – PV market analysis and Economics of Solar Photovoltaic systems.

UNIT –V :SOLAR PASSIVE ARCHITECTURE

Passive heating concepts – Direct heat gain – Indirect heat gain – Thermal storage wall – Attached Green house – Isolated gain and sunspaces – Passive cooling concepts – Evaporative cooling – Shading and ventilation – Radiative cooling – Green coupling – Application of wind – Water and earth for cooling – Paints and cavity walls for cooling – Roof radiation traps – Energy efficient landscape design.

TEXT BOOKS:

1. Sukhatme S P, J K Nayak, *Solar Energy, Principle of Thermal Storage andCollection*, 3rdEdition, Tata McGraw Hill, 2008.
2. *Chetan Singh Solanki, Solar Photovoltatics, Fundamentals, Technologies and* Applications, PHI Learning Private Limited, 2011.

REFERENCES:

1. Peter Würfel, *Physics of Solar Cells: From Basic Principles to AdvancedConcepts*, Wiley–VCH, 2009.Jeffrey M. Gordon, Solar Energy: The State of the Art, Earthscan, 2013.
2. Garg H. P. and Prakash J., *Solar Energy Fundamentals and application*,TataMcGraw– Hill Publishing, 7th Reprint 2006.
3. Roger A. Messenger and Jerry Vnetre, *Photovoltaic Systems Engineering*, CRC Press, 2010.
4. Kalogirou S. A., *Solar Energy Engineering: Processes and Systems*, 2ndEdition, Academic Press, 2013.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18C03	LOW TEMPERATURE PHYSICS	3	0	0	3	3

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To understand the general scientific concepts of low temperature physics	a	b			
2	To understand the properties of materials at low temperature	b	c	e		
3	To educate the new techniques available to produce and measure low temperatures	b	c	d	h	
4	To understand the concept of specific heat and hyperfine properties	b	c	f		

UNIT –I :PRODUCTION OF LOW TEMPERATURE:

Introduction – Joule Thomson effect – Regenerative cooling – Vacuum pumps – liquefaction of air – Hydrogen – Helium – Maintenance of low temperature – production of temperature below 1 K – Adiabatic demagnetization – Evaporative cooling of He–3 – Dilution refrigeration – Laser cooling – Nuclear demagnetization

UNIT –II :MEASUREMENT OF LOW TEMPERATURE

The gas thermometer and it corrections – Secondary thermometers– resistance thermometers, thermocouples– vapour pressure thermometers– magnetic thermometers.

UNIT –III :LIQUID AND SOLID CRYOGENS

Liquid Nitrogen – Liquid oxygen – Liquid hydrogen – Liquid He –4 and He –3 – Solid He– 4 and He –3 – Lamda point – Superfluidity – Density – Compressibility factor – viscosity and thermal properties – Velocity of sound in liquid helium.

UNIT –IV :ELECTRICAL AND MAGNETIC PROPERTIES

Experimental observations – Theories of sommerfield and block – Superconductivity – magnetic properties of superconductors – Thermal properties of superconductors – penetration depth and high frequency resistance – Ferromagnetism – Diamagnetism – paramagnetism – Paramagnetic saturation.

UNIT –V :SPECIFIC HEATS, SPECTROSCOPIC AND HYPERFINE PROPERTIES

Specific heats – Rotational specific heat of Hydrogen – Einstein‟ s and Debye‟ s theories –Schottky effect – Anomalies in specific heats at low temperature –

Infrared– visible spectra – Zeeman spectra at low temperature – Dielectric constant and its measurement – Magnetic susceptibility – NMR and electron paramagnetic resonance at low temperature – Nuclear magnetic properties – Mossbauer effect and other hyperfine properties at low temperature.

TEXT BOOKS

1. Cornelis Jacobus Gorter, D. F. Brewer, Progress in *Low Temperature Physics*, Elsevier Ltd, 2011.
2. Christian E. and Siegfried H, *Low Temperature Physics*, Springer, 2005.

REFERENCES

1. Jack Ekin, *Experimental Techniques for Low–Temperature Measurements*, OUP, Oxford, 2006.
2. Charles P. Poole Jr., Horacio A. Farach, Richard J. Creswick and RuslanProzorov, *Superconductivity* Elsevier Ltd, 2007.
3. John Wilks, *Properties of Liquid and Solid Helium*, Oxford University Press, 1967.
4. Jackson L.C., *Low Temperature Physics*, Methuen and Company,1962.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18S04	**ATMOSPHERIC OBSERVATIONS**	0	1	2	3	2

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				**Students Outcomes**		
1	To generate the interest on atmospheric instrumentation	**a**	**d**	**h**	**i**	
2	To provide basic analytical techniques for atmospheric measurements	**a**		**h**	**i**	

3	To enhance the basic knowledge of meteorological information from satellites	**a**		**h**	**i**	
4	To prepare the students with necessary atmospheric background	**a**		**h**	**i**	**n**

List of experiments (Any 9 Experiments)

1. Point measurements of rainfall –Rainguage
2. Pressure – altitude relationships
3. Estimation of evapotranspiration from micro–meteorology method
4. Estimation of solar radiation and sun shine hours – comparison with Automatic Weather Station measurements
5. Wind measurements and plotting from Automatic Weather Station
6. Calculation of integrated water vapor, actual and saturated vapor pressure using radiosonde data – visit to Radiosonde
7. Handling the INSAT data to understand the cloud cover and estimation of rainfall
8. Handling reanalysis data to derive cloud liquid water content
9. Air quality index using PM10 measurement
10. Plotting of surface and upper air data and preparation of weather chart
11. Analysis of surface and upper air data for western disturbances

TEXT BOOKS:

1. *Guide to Meteorological Instruments and Methods of Observation*. Sixth edition. WMO.
2. Meteorology Manual: *The practical guide to the weather*, Storm Dunlop, 2014, Haynes Publishing, UK.

REFERENCES:

1. John M Wallace and Peter V Hobbs, *Atmospheric Science an Introductory Survey*, , Academic Press, International Geophysics Series, 2005
2. Thomas D Potter and Bradley R Colman, *Handbook of Weather, Climate and Water*;, Wiley Interscience, 2003

Course Nature: Practical				
Assessment Method-Practical Component (Marks: 100)				
In-Semester	Assessment Tool	Experiments	Model Examination	Viva-Voce
	MARKS	70	20	10
Total				100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18S05	DIGITAL SIGNAL PROCESSING	0	1	2	3	2

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To understand about the parameters of a signal	a	d	h	i	
2	To understand the necessity of estimation of SNR and MSE	a		h	i	
3	To know how to estimate the frequency content of the signal	a		h	i	
4	To gain knowledge on basic filtering functions in MATLAB	a		h	i	n

List of Experiments (Any 9 Experiments)

1. Write a MATLAB code to create a signal equal to the sum of two sine waves with the following characteristics:

- 3–second duration
- Sampling frequency = 2 kHz
- Sinusoid 1: frequency 50 Hz (low), amplitude 10, phase = 0
- Sinusoid 2: frequency 950 Hz (high), amplitude 1, phase =0

2. Write a MATLAB code to create a sinusoidal signal with a frequency of 50 Hz of 100 samples and a random noise signal of 100 samples. Compute the powers of sinusoidal signal and noise in terms of dB.
3. Write a MATLAB code to estimate the Signal to Noise ratio (SNR) of a signal in terms of dB (Generate sinusoidal and noise signals of known powers for estimation of SNR)

4. Write a MATLAB code to estimate Mean Square Error (MSE) between a clean signal (signal free from noise) and a noisy signal.
5. Write a MATLAB code to create a signal composed of two different frequencies and use *filter* function for low pass and high pass filtering. Evaluate the output with *fft* function.
6. Write a MATLAB code to perform convolution and cross correlation between two signals.
7. Design a digital FIR lowpass filter using MATLAB/Simulink with the following specifications:

- Passband cutoff frequency: fp=2 kHz
- Stopband cutoff frequency: fs=3 kHz
- Passband Ripple: Rp=0.25 dB
- Stopband attenuation: Rs= 0.25 dB
- Sampling frequency: fs=20 kHz

8. Design a digital IIR lowpass filter using MATLAB/Simulink with the following specifications:

- Filter Order: 8th Filter type: elliptic IIR
- Passband cutoff frequency: fp= 300 Hz
- Passband Ripple: Rp= 0.5 dB
- Stopband attenuation: Rs= 50 dB
- Sampling frequency: fs= 4 kHz

9. Design a digital FIR bandpass filter using MATLAB/Simulink with the following specifications:

- Passband: 8–12 kHz
- Stopband Ripple: Rs= 0.001
- Passband Ripple: Rp= 0.001
- Transition width: 3 kHz
- Sampling frequency: fs= 44.1 kHz

Obtain the filter coefficients and frequency response for the above FIR using the Blackman window method.

10. Design a digital IIR bandpass filter with Butterworth characteristics using MATLAB/Simulink meeting the following specifications:

- Passband: 8–10 kHz
- Sampling frequency: fs= 44.1 kHz
- Filter Order: 4
- Filter Characteristics: Butterworth
- Obtain the filter coefficients and frequency response for the above FIR using theBlackman window method.

TEXT BOOKS

1. Robert A. Schilling, Sandra L. Harris, *Introduction to Digital Signal Processing using MATLAB* 2nd Edition, Cengage Learning
2. Sharma S, *Digital Signal Processing with Matlab Programs* 6/e, S K KATARIA & SONS

REFERENCES

1. Vinay K. Ingle, John G. Proakis, *Essentials of Digital Signal Processing* Using MATLAB, Cengage Learning
2. Michael Weeks, *Digital Signal Processing Using MATLAB and Wavelets*, Infinity Science Press

Course Nature: Practical				
Assessment Method-Practical Component (Marks: 100)				
In-Semester	**Assessment Tool**	**Experiments**	**Model Examination**	**Viva-Voce**
	MARKS	**70**	**20**	**10**
Total				**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18S06	**MATERIAL CHARACTERISATION TECHNIQUES**	0	1	2	3	2

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To make the student familiarize with the basics of materials science experiments.	**a**	**d**	**h**	**i**	
2	To enable the student to explore the field of semiconductors.	**a**		**h**	**i**	
3	To make the student understand the basic concepts in magnetism	**a**		**h**	**i**	
4	To enhance the students understand the concepts in crystal physics.	**a**		**h**	**i**	**n**

List of Experiments (Any 9 Experiments)

1. Determination of the resistivity of a given material using two probe and four probe method.
2. Determination of dielectric constant of a given material.
3. Determination of Planck's constant using light emitting diode.
4. Study of laser beam parameters: (a) measurement of wavelength of He–Ne laser light using ruler (b) measurement of the thickness of thin wire with laser (c) determination of particle size using a given laser source.
5. Determination of Hall voltage and carrier type of a given semiconducting material.
6. Trace the magnetic hysteresis loop on various magnetic materials.
7. Determination of magnetic susceptibility of a given paramagnetic liquid by Quincke's method.
8. Determination of lattice parameters using x–ray diffraction.
9. Study of coherence on Michelson interferometer and Fabry–Perot etalon
10. Resistance and Magnetoresistance of some standard materials.

TEXT BOOKS

1. Thiruvadigal, J. D., Ponnusamy, S. Preferencial Kala, C. and Krishna Mohan, M. *Materials Science*, Vibrant Publications, Chennai. 2014.
2. Gupta S. K., *Engineering Physics Practical*, 9th Edition, Krishna Prakashan Media Publishers, 2010.

REFERENCES

1. Callister, Jr. W.D. *Materials Science and Engineering: An Introduction*, 7th Edition, Wiley, 2007.
2. Kasap S.O., *Principles of Electronic Materials and Devices*, Tata McGraw Hill Edition, 2002.
3. Sam Zhang, *Materials Characterization Techniques*, CRC Press, 2008.

Course Nature: Practical				
Assessment Method-Practical Component (Marks: 100)				
In-Semester	**Assessment Tool**	**Experiments**	**Model Examination**	**Viva-Voce**
	MARKS	**70**	**20**	**10**
Total				**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL L+T+P	C
UCY18404	MY INDIA PROJECT	0	0	0	0	2

Course Nature : Project				
Assessment method- (fully internal)				
In-Semester	Assessment Tool	Review-1	Review-2	Total
	Marks	30	70	100
Total				100%

Subject Code	Subject Title	L	T	P	Total L+T+P	C
CAC18401	VERBAL ABILITY AND REASONING	2	0	0	2	2

COURSE OBJECTIVE

To instill confidence in students and develop skills necessary to face the challenges of competitive exams and placements

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		Student Outcomes				
1.	To enable the students understand the syntax of English and develop their lexical skills	d	f	h	n	
2.	To develop comprehension and interpretation skills	d	e	f	h	N
3.	To enhance vocabulary skills and improve repertoire of words	d	f	h	m	N
4.	To help the students succeed in competitive exams and placements	j	m	n		

UNIT –I

Spotting error, Change of speech, Change of voice

UNIT –II

Synonyms, Antonyms, Idioms, Phrasal verbs, one word substitution

UNIT – III

Sentence improvement, Sentence completion (Grammar based)

UNIT – IV

Sentence completion (Vocabulary based), Odd word

UNIT – V

Reading comprehension, Word analogy, Para jumble

TEXT BOOKS

1. Hari Mohan Prasad and Meenakshi Upadhyay, *Objective English for*
2. *Competitive Examinations*, McGraw Hill Education.

REFERENCES

1. Norman Lewis, *Word Power Made Easy New Revised and Expanded Edition*, Goyal publication, 2011
2. Raymond Murphy, *Intermediate English Grammar*, Cambridge University Press, 2007

SEMESTER V

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18501	SOLID STATE PHYSICS	4	1	0	5	4

	INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:	Students Outcomes				
1	To understand the basic knowledge on crystal structures and crystal systems	b	c			
2	To acquire the knowledge of bonding in solids	b	c	f		
3	To acquire knowledge on lattice vibrations, thermal properties and electric conductivity of solids	c	e	f	h	
4	To comprehend the concepts of dielectric properties of solids and superconductivity	b	e	f		n

UNIT –I: CRYSTAL PHYSICS

Crystalline and amorphous solids – Lattice and basis – Unit cell and primitive cell – Crystal systems – Translation vectors – Number of atoms per unit cell in a Cubic Crystal – Bravais lattice – Simple cubic– BCC FCC lattices – HCP and diamond structure – Miller indices – Interplanar spacing –Crystal symmetry – Crystal diffraction – Bragg's law – Experimental diffraction methods – Laue method – Powder diffraction method – Reciprocal lattice.

UNIT –II: BONDING IN SOLIDS

Crystal binding – Crystals of inert gas – Van der Walls – Cohesive energy – Compressibility and bulk modulus – Ionic Crystals – Madelung energy – Evaluation of Madelung constant – Covalent crystals – Energy value for single covalent bonds – Metallic crystals – Hydrogen bonding – Atomic radii – Tetrahedral covalent radii and ionic crystal radii.

UNIT –III :LATTICE VIBRATION AND THERMAL PROPERTIES OF SOLIDS

Vibration of one dimensional monatomic linear lattice – Derivation of force constant – Dispersion relation – Brillouin zone – Phase velocity – Group velocity – Phonons – Characteristics of phonons – Phonon momentum – Thermal Properties of Solids – Classical theory of specific heat – Einstein's theory of specific heat – Debye's theory of specific heat.

UNIT – IV: FREE ELECTRON THEORY OF METALS

Free electron theory –Fermi Dirac statistics and electronic distribution in solids – Density of energy states and Fermi energy – The Fermi distribution function – Drude Lorentz theory – Electrical conductivity – Thermal conductivity – Wied–Mann and Franz ratio – Hall effect – Hall voltage and Hall coefficient – Mobility and Hall angle – Importance of Hall effect – Experimental determination of Hall coefficient.

UNIT –V: DILECTRICS AND SUPERCONDUCTIVITY

Dielectrics – Dielectric constant and displacement vecto r– Clausissmossotti relation – Atomic or molecular polarizability – Types of polarizability – Superconductivity – Occurrence of superconductivity – Destruction of superconductivity by magnetic fields – Meissner effect – London equation – Josephson effect – Energy gap – Elements of BCS theory – Classification of Superconductivity – Application

TEXT BOOKS

1. Pillai S.O., *Soild State Physics*, 6th Edition, New Age Science, 2013.
2. Charles Kittel, *Introduction to Solid State Physics*, Wiley, 2005.

REFERENCES

1. Ashcroft W. and Mermin N.D., *Solid State Physics, H*olt–Rinehart–Winston, 1976.
2. Blakemore J. S., Solid State Physics, 2nd Edition, Cambridge University Press, Cambridge, 1974.
3. Dekker A. J., *Solid State Physics*, Mac Millan, 1971.
4. Giuseppe Grosso, Giuseppe Pastori Parravicini, *Solid State Physics,* Academic Press, Second Edition, 2014.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18502	STATISTICAL MECHANICS	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To understand the basic concepts of statistical mechanics	a	b	c		
2	To enable the student to explore the field of statistical mechanics	b	c	f		
3	To emphasize the significance of classical and quantum statistics	c	e	f		
4	To understand the significance of different statistics	b	e	f		n

UNIT – I: BASIC STATISTICS AND PHASE SPACE

Probability - distribution functions - Binomial distribution - Probability distribution for large–scale N - Guassian probability distributions - Basic postulates of Statistical Physics - Specification of states - Macro state - Micro State - Phase Space - Density distribution in phase space and its division - Statistical average values - Condition of equilibrium - Stirling's Approximation - Entropy and Thermodynamic probability ($S = K \ln \Omega$) - Boltzmann entropy relation.

UNIT – II: ENSEMBLES AND THERMODYNAMIC CONNECTIONS

Definition - Micro–canonical - Canonical and Grand Canonical ensembles - their thermodynamic connections - Statistical definition of temperature and interpretation of second law of thermodynamics – Pressure - Entropy and Chemical potential - Entropy of mixing and Gibb's paradox - Partition function and Physical significances of various statistical quantities.

UNIT – III: CLASSICAL STATISTICS

Maxwell–Boltzmann statistics and Distribution law - Energy distribution function - Maxwell–Boltzmann law of velocity distribution (most probable velocity - average velocity, RMS velocity) - Limitations of M–B statistics.

UNIT – IV: BOSE–EINSTEIN STATISTICS

Bridging Microscopic and Macroscopic behavior - indistinguishability of particles and its consequences - Transition to quantum statistics and its implications -

Bose–Einstein Statistics B–E distribution law - Thermodynamic functions of a Completely Degenerate Bose Gas - Bose–Einstein condensation, properties of liquid He (qualitative description) - Radiation as photon gas - Bose's derivation of Planck's law.

UNIT – V: FERMI–DIRAC STATISTICS

Fermi–Dirac Statistics - Fermi–Dirac Distribution Law - Thermodynamic functions of an ideal Completely Degenerate Fermi Gas - Fermi Energy - Electron gas in a Metal - Specific Heat of Metals.

TEXT BOOKS

1. B.B.Laud "Introductions to Statistical Mech."(McMillan)
2. Bhattarjee J.K. "Statistical Physics", (Allied Publishers)

REFERENCES

1. F.Reif, "*Statistical Physics*", (Mc.Graw Hill)
2. Kamal Singh "*Elements of Statistical Mechanics*", (S.Chand).
3. K.Hung "*Statistical Physics*"(Chapman and Hall/CRC)

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18503	**ANALOG AND DIGITAL ELECTRONICS**	**4**	**0**	**0**	**4**	**4**
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				**Students Outcomes**		
1	To understand the concept of networks and semiconductors	**a**	**b**	**c**		
2	To understand the working principles of a transistors	**b**	**c**	**f**		

3	To familiarize the operation of amplifiers and oscillators	**c**	**e**	**f**	**h**	
4	To understand the basic concepts of number systems. To develop the digital concepts using logic gates. To apply digital concepts in combinational and sequential logic systems	**b**	**e**	**f**	**h**	

UNIT – I: NETWORK THEOREM AND SEMICONDUCTORS

Circuit Elements and Kirchhoff's Law – Methods of Analysing circuits – Mesh and Nodal Method – Thevenin Theorem – Norton theorem – Intrinsic and extrinsic semi conductor – PN junction diode–construction–Biasing of PN junction–VI characteristics of diode–Zener diode–Bipolar Junction Transistors – Construction–CE, CB configuration–input and output characteristics–Two port network analysis of transistor–FET – Construction and characteristics of JFET– Biasing of JFET– Depletion and Enhancement modes–Important Relationships – MOSFET– Depletion type of MOSFET – Enhancement type of MOSFET

UNIT – II: AMPLIFIERS AND OSCILLATORS

RC coupled single stage amplifiers–Frequency response –Feedback constant– Gain with feedback – Advantages of negative feedback amplifier–(quantitative treatment only) – Power amplifiers –Class A and Class B amplifiers,. Principle of Feedback and oscillators– Feedback amplifier— Oscillator operations – Burcausan criteria–Sinusoidal oscillators–Hartly oscillator–Colpit's oscillators– Phase shift oscillator– Wien bridge oscillator

UNIT – III: WAVE SHAPING AND SWEEP CIRCUITS

Operational Amplifiers – Open loop and closed loop –OP–AMP characteristics– Ideal OP–AMP with virtual ground–Inverting and Non inverting OP–AMP–Basic OP–AMP with applications– Adder –Subtractor –Voltage follower – Clipping circuit – Positive clipper – Biased clipper – Combinations clipper – Applications of clipper– Clamping Circuits–Basic idea of a clamper – Positive clamper – negative clamper–.IC555 (Timer IC) – Astable multivibrator – Monostable multivibrator.

UNIT – IV: NUMBER SYSTEMS AND LOGIC GATES

Introduction to decimal– Binary– Octal– Hexadecimal number systems–Inter conversions–BCD code– Excess –3 code– Gray code –One's complement

andtwo's complements– Arithmetic operations– Addition– Subtraction– Basic and derived logic gates– Symbols and their truth tables– AND–OR– NOT– NAND– NOR– XOR– XNOR– Universal NAND and NOR gates–Boolean algebra – Basic laws of Boolean algebra – De– Morgan's theorems– Reducing Boolean expressions using Boolean laws– SOP and POS forms of expressions–Min term and max terms– Karnaugh map simplification

UNIT – V: COMBINATIONAL AND SEQUENTIAL LOGIC SYSTEMS

Half and full adders– Half and full subtractors– Binary adders and subtractors– Two's complement adder/subtractor circuits– Binary Coded Decimal (BCD) adder–Decoder–Encoder–Multiplexer–Demultiplexer–.Flip flop–RS flip flop – Clocked RS flip flop–D flip flops – JK flip flop – JK as master slave flip flops– Registers– Shift registers–Shift left and Shift right registers–Counters– Synchronous and asynchronous counters–Ripple counter–Ring counter–Up and Down counter –Decade counter–.SISO and SIPO Shift registers

TEXT BOOKS

1. Sudhakar A and Shyammohan S Palli, *Circuits and Network Analysis andSynthesis*, 4thEdition, Tata McGraw Hill, 2010.
2. Metha V.K., Mehta R., *Principles of Electronics*, S. Chand and Company Ltd., 2008.

REFERENCES

1. Jacob Millman, Christos C Halkias, Satyabrata Jit, *Electron Devices andCircuits*, Tata McGraw Hill, 2010.
2. Millman and Halkias ,*Electronics Devices and Circuits*, Tata Mc Graw Hill,2008.
3. William H.Hyte, Jr, J.E.Kemmerly and Steven M.Durban, *Engineering CircuitAnalysis*, 7thEdition, McGraw Hill, 2010.
4. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and CircuitTheory*, Pearson Education, 9thEdition, 2009.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18504	ATOMIC PHYSICS AND SPECTROSCOPY	4	0	0	4	4
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				Students Outcomes		
1	To understand the principles of atomic physics	a	b	c		
2	To familiarize with various atomic models and atomic spectra	b	c	e		
3	To understand the electric and magnetic field effects on atomic spectra	c	e	f		
4	To learn basic principles and applications of spectroscopy	b	e		h	

UNIT – I: ATOMIC STRUCTURE I

Early models of the atom – Rutherford's experiment – Rutherford model of the atom – Bohr model of the atom – Bohr's theory of hydrogen spectrum – Spectral series and energy levels of hydrogen atom – Bohr's correspondence principle – Sommerfeld theory of hydrogen atom – Sommerfeld's relativistic theory

UNIT –II:ATOMIC STRUCTURE II

Vector atom model – Quantum numbers associated with vector atom model – The exclusion principle and the periodic table – Coupling schemes – Fine structure of spectral lines – Term symbol – Stern–Gerlach experiment – Interpretation of results –Normal and Anomalous Zeeman effect – Paschen Back and Stark effects

UNIT –III: X–RAY SPECTRA

Origin of X–ray spectra – Continuous and Characteristic X–rays – Moseley's law–Absorption of X–rays – Hydrogen like character of X–ray spectrum – X–ray absorption spectrum. Compton Effect – derivation of expression for change in wavelength – experimental verification.

UNIT –IV: MOLECULAR SPECTRA

Basic elements of spectroscopy – Rotational spectra of rigid diatomic molecules – Isotopic shift and Intensities of spectral lines – Vibrational, Rotation–Vibration spectra of diatomic molecules – Introduction to Electronic spectra of molecules.

UNIT –V: RAMAN SPECTRA

Raman scattering – classical description – Theoretical explanation based on quantum theory – Characteristic properties of Raman lines – Stoke's and Anti–Stoke's Lines – Vibrational and rotational Raman spectra of diatomic and polyatomic molecules –Structure determination from Raman and Infrared spectroscopy.

TEXT BOOKS

1. Subrahmanyam N, Brij Lal, Jevan Shesan, *Atomic and Nuclear Physics,* 3rd Edition, S Chand and Company Ltd, 1986.
2. Banwell C N, McCash E M, *Fundamentals of Molecular Spectroscopy*, Tata McGraw-Hill, 2008

REFERENCES

1. Beiser A, *Concepts of Modern Physics*, 6th Edition, Mc–Graw Hill, 2009
2. Christopher J. Foot, *Atomic Physics*, Oxford University Press, 2005
3. Krane K S, *Modern Physics*, Wiley, 2016
4. Singh R. B, *Introduction to Modern Physics*, New Age International (P) Limited Publishers, 2009

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18505	**GENERAL PHYSICS LABORATORY–II**	**0**	**0**	**4**	**4**	2
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				**Students Outcomes**		
1	To gain knowledge in the scientific methods and learn the process of measuring different Physical variables	**a**	**d**	**h**	**i**	
2	To enable the student to explore the field	**a**		**h**	**i**	

	of properties of matter					
3	To allow the student to have a deep knowledge in the field of materials science.	**a**		**h**	**i**	
4	To make the student understand the basic concepts in Electricity and Magnetism.	**a**		**h**	**i**	**n**

List of Experiments (Any 9 Experiments)

1. Young's modulus – Koenig's method – Uniform bending.
2. Young's modulus – Koenig's method – Non uniform bending.
3. Young's modulus – cantilever – depression – (Static method)–(Scale and telescope)
4. Potentiometer–calibration of high range voltmeter
5. EMF of a thermocouple–Mirror galvanometer(or table galvanometer)
6. B.G.–Absolute capacitance of a capacitor.
7. Ballistic Galvanometer – comparison of emf's of two cells.
8. To study V–I characteristics of a light dependent resistor (LDR).
9. Determination of Planks constant using Light Emitting Diode.
10. Determination of Hall coefficient and carrier type for a given semiconductor material.
11. To trace the hysteresis loop for a magnetic material.
12. Determination of Magnetic susceptibility for a given paramagnetic liquid by Quincke's method.

TEXT BOOKS

1. R. K. Shukla & Anchal Srivastava. *Practical Physics*, NEW AGE INTERNATIONAL (P) Ltd, Publishers, (Formerly Wiley Eastern Limited), 4835/24, Ansari Raod, Daryagani, New Delhi–11002. 2006.
2. Thiruvadigal, J. D., Ponnusamy, S. Preferencial Kala, C. and Krishna Mohan, M. *Materials Science*, Vibrant Publications, Chennai. 2014.

REFERENCES

1. G. L. Squires, *Practical Physics*, Fourth edition, Cambridge University Press, 2001.
2. D. Halliday, R. Resnick and J. Walker, *Fundamentals of Physics*, 6th Ed., John Wiley and Sons, Inc., New York, 2001.
3. F.A. Jenkins and H.E. White, *Fundamentals of Optics*, 4th Ed., Reprint McGraw–Hill Book Co., 2007.
4. GeetaSanon, *B. Sc., Practical Physics*, 1st Edition. R. Chand & Co, 2007.

COURSE NATURE: PRACTICAL						
Assessment Method-Practical Component (Marks: 100)						
In-semester	Assessment tool	Experiments	Observation	Regularity	Model Examination	Total
	MARKS	25	10	5	10	50
End Semester Weightage						50%
Total						100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18506	ANALOG AND DIGITAL ELECTRONICS LABORATORY	0	0	4	4	2
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				Students Outcomes		
1	To impart hands on experience in verification of circuit laws and theorems	a	d	h	i	
2	To study experimentally the characteris	a		h	i	
3	To familiarize the operation of amplifiers and oscillators	a		h	i	
4	To understand the basic concepts of number systems. To develop the digital concepts using logic gates. To apply digital concepts in combinational and sequential logic systems	a		h	i	n

LIST OF EXPERIMENTS (Any 9 Experiments)

1. To verify the Thevenin theorem.
2. To obtain the static characteristics of a PN junction diode and then obtain the forward resistance of the diode at a given operating point.
3. Study the V–I characteristics of a Zener diode and note down its breakdown potential.
4. Study the characteristics curves of BJT and FET.
5. CE amplifier and make the (i) Upper cut off (ii) Lower cutoff frequencies and hence estimate the BW.
6. Study of class A and class B power amplifiers.

7. Study of Colpitt's Oscillators.
8. Study of Hartley Oscillators.
9. Study of Diode as clipper and clamper.
10. Study of timer circuit using IC555 and configuration for monostable and astable multivibrator.
11. Logic gates using Discrete components and ICs
12. Universal logic gates using NAND and NOR gates
13. FlipFlops.
14. Decade counter.
15. Double digit seconds counter – 7 segment.
16. Half adder, Full adder, Half subtractor and Full subtractor using IC.
17. Shift Registers.
18. Ring and Ripple counters , up and down counters

TEXT BOOKS

1. David A. Bell, *Laboratory Manual for Electronic Devices and Circuits*, 4th Edition, Oxford University Press, 2009.
2. Maheswari.L.K and Anand.M.M.S, *Laboratory Manual for Introductory Electronic Experiments,* New Age, 2010.

REFERENCES

1. Gaykwad A., *Operational Amplifier and Linear Integrated Circuits,* Prentice Hall, 2006
2. David A Bell, *Fundamentals of Electrical Circuits: Lab Manual,* 4th Edition, Oxford University Press, 2009.
3. Ouseph C.C, Rangarajan C., Balakrishnan R., *A Text Book of Practical Physics*, S.Viswanathan Publisher–Part II, 2005.
4. Malvino A.P.and Leach D.P., *Digital Principles and Applications,* 4th Edition, McGraw Hill, 2007.

COURSE NATURE: PRACTICAL						
Assessment Method-Practical Component (Marks: 100)						
In-semester	**Assessment tool**	**Experiments**	**Observation**	**Regularity**	**Model Examination**	**Total**
	MARKS	**25**	**10**	**5**	**10**	**50%**
End Semester Weightage						**50%**
Total						**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18C04	RADIATION PHYSICS	3	0	0	3	3

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To demonstrate a knowledge of fundamental aspects of the structure of the nucleus, radioactive decay, nuclear reactions and the interaction of radiation and matter	a	b	c		
2	To describe experimental techniques used for Radiation physics purposes discuss their influence on development of new technologies in instrumentation	b	c	e	h	
3	To allow the student to have a good knowledge on modern radiation therapies, dosimeters and computed tomography and magnetic resonance imaging	b	c	e	g	
4	To demonstrate a knowledge of fundamental aspects of the structure of the nucleus, radioactive decay, nuclear reactions and the interaction of radiation and matter	b	e	f		

UNIT – I: STRUCTURE OF MATTER AND X–RAYS

Structure of matter and nucleus, atomic mass and energy units – Energy levels– Nuclear forces – Nuclear energy levels – Particle radiation – Elementary particles – Electromagnetic radiation– Wave model and Quantum model. Nuclear Transformation – Radioactivity – Decay constant – Radioactive series – Radioactive equilibrium –Activation of nuclides–Production of X–rays – X–ray tube – X–ray circuit – voltage rectification – X–ray energy spectra – Operating characteristics.

UNIT – II: CLINICAL RADIATION GENERATORS

Kilo–voltage units– Grenz–ray therapy – Contact therapy – Superficial therapy – Orthovoltage therapy or deep therapy – Super voltage therapy – Resonant transformer units – Megavoltage therapy – Van de Graaff generator – Linear accelerator – Betatron – Cyclotron – Microtron – Machines using radionuclides– The role of Cobalt60 in Therapy – Heavy particle beams.

UNIT – III: IONIZING RADIATION

Ionizing Radiation – Interaction of ionizing radiation— Photon beam description and attenuation – Attenuation coefficient – Energy transfer– energy absorption coefficient – Interaction of photons with matter – Coherent scattering – The Roentgen – Free air ionization chamber – String electrometer – Ion collection– Saturation and collection efficiency – Measurement of exposure–Quality of X–Ray Beams– Half value layer and its measurement – Peak voltage–Direct indirect measurement – Effective energy–Measurement of Absorbed Dose– Radiation absorbed dose – Relation between Kerma – Exposure – Absorbed dose.

UNIT – IV: CLASSICAL RADIATION THERAPY

Dose distribution and scatter analysis–Phantoms – Depth dose distribution – Dependence on beam quality and depth – Tissue air ratio (TAR)– Dose calculation parameters– Collimator Scatter Factor – Phantom Scatter Factor – Tissue–Phantom and TissueMaximum Ratios (TMR)– ScatterMaximum Ratio (SMR) – Practical Applications – Accelerator Calculations– SSD Technique – Cobalt 60 Calculations–Treatment planning–Acquisition of Patient Data– Internal Structures–Computed Tomography – Magnetic Resonance Imaging–Ultrasound–Skin Dose–Electron beam therapy – Brachytherapy.

UNIT – V: MODERN RADIATION AND PROTECTION

Modern Radiation Therapy–ImageGuided Radiation Therapy – Proton Beam Therapy–Dosimetry–Dosimeter – Film badge dosimeter – Pocket Dosimeter–Radiation Protection– Dose Equivalent – Effective Dose – Background Radiation – LowLevel Radiation Effects – Effective DoseEquivalent Limits– Occupational and Public Dose Limits.

TEXT BOOKS

1. Fiaz.M.Khan, *The Physics of Radiation Therapy*, Lippincott Williams and Wilkins, 4th Edition, 2010.
2. Meredith W.J. and J.B. Massey, *Fundamental Physics of Radiology*, A. John Wright and Sons Ltd.,3rd Edition, 1983.

REFERENCES

1. William.R.Hendee, Geoffery.S.Ibbott and Eric.G.Hendee, *Radiation TherapyPhysics*, A.John Wiley and Sons.,Inc, 3rdEdition, 2005.
2. Smith F.A., *A Primer in Applied Radiation Physics*, World scientific publishing Co., 2000.
3. Podgarsak E.B., *Radiation Physics for Medical Physicists*, Springer, 2006.
4. Evans R. D., *Atomic Nucleus*, Textbook Publications, 2003.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	Assessment Tool	Cycle Test I	Cycle Test II	Model Examination	Assignment	Attendance	Total
	Marks	10	10	20	5	5	50%
End Semester Weightage							50%
Total							100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18C05	PLASMA PHYSICS	3	0	0	3	3

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To understand the basic concepts of Plasma and its relevant topics	a	b	c		
2	To understand the basic mechanism of single particle motion and its kinetic theory	b	c	e		
3	To educate scientifically the new developments in engineering and technology	b	c	e	g	
4	To understand the various methods of Plasma diagnostics	b	e	f		

UNIT – I: BASICS OF PLASMA

Plasma – Its definition – Composition and characteristics – Microscopic and macroscopic description of plasma–Motion of charged particle in uniform magnetic field – Motion of charged particle in uniform electric and magnetic field (E x B–drift) – curvature drift – Magnetic confinement of plasma–Collision processes in Plasma– Non Coulomb collisions –Pinch effect – Solar corona and Solar wind – Van Allen radiation belt.

UNIT – II: KINETIC THEORY

The Distribution Function – Differential Flux – Velocity Distribution Functions – The meaning of f (v) Equations using Kinetic theory – Derivations of the fluid equation Vlasov Equation – Collisions – plasma Oscillations and Landau damping – Derivation of Landau Damping – BGK and van Kampen modes – Experimental verification –Kinetic effects in a Magnetic field.

UNIT – III: FLUID THEORY AND WAVES

Fluid Equations and Drifts – Non–neutral plasmas – Plasma Oscillations–Sound Waves – Ion Acoustic Waves – Electrostatic Waves – Electromagnetic waves – MHD Waves – Alfven and Magnetosonic – Wave–Particle Interactions – Instabilities–– Interchange Instability – Mirror Instability –.

UNIT – IV: MAGNETO HYDRODYNAMIC FLUIDS

Introduction – The Equations of MHD Equations – Ideal MHD – Hydromagnetic Equilibria – Magnetic Pressure – Magnetic Field Convection and Diffusion – Flux Freezing – MHD Waves – The Solar Wind – Parker Model of Solar Wind – Interplanetary Magnetic Field – Mass and Angular Momentum Loss – MHD Dynamo Theory – Homopolar Generators – Slow and Fast Dynamos – Magnetic Reconnection.

UNIT – V: PLASMA DIAGNOSTICS

Remote Diagnostics–Optical spectroscopy – Microwave interferometry – Laser Induced Fluorescence (LIF)– Langmuir Probes: – Construction and circuit – The electron characteristic – Electron saturation – Space potential – Ion saturation current –Distribution functions – RF compensation – Double probes and hot probe.

TEXT BOOKS

1. Gurnett D. A. and A. Bhattacharjee, *Introduction to Plasma Physics,* Cambridge, 2005.
2. Paul M. Bellan, *Fundamentals of Plasma Physics*, Cambridge University Press, 2006.

REFERENCES

1. Bittencourt J. A, *Fundamentals of Plasma Physics*, Springer, 2004.
2. Marcel Goossens, *An Introduction to Plasma Astrophysics and Magneto hydrodynamics*, Springer, 2003.
3. Frencies F chen, *Introduction to Plasma and Controlled Fusion*, Plenum Press, 1974.
4. Podgomyl I M, *Topics in Plasma Diagnostics*, Plenum Press, 1971.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	Assessment Tool	Cycle Test I	Cycle Test II	Model Examination	Assignment	Attendance	Total
	Marks	10	10	20	5	5	50%
End Semester Weightage							50%
Total							100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18C06	ASTROPHYSICS	3	0	0	3	3

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To describe the nature, structure, distribution, and formation of astronomical objects, including planets, stars, and galaxies, and the history of the universe.	a	b	c		
2	To demonstrate an appreciation of the universality of physical laws and apply these laws to explain phenomena in astronomical systems and the universe	b	c	e		
3	To define and interpret the observational properties of astronomical objects.	a	b	c	e	
4	To propose, plan, and conduct astronomical observations with professional telescopes.	b	e	f		n

UNIT- I: INTRODUCING ASTRONOMY

Solar System Overview- Constituents- Astronomical measurements- Units of length time and mass-Constellations – Motion of the Sky- Celestial Sphere- Positions- Equinoxes And Eccentricity - The Length Of A Day - The Length Of Daylight - The Length Of A Second - Solar Calendar - Eclipses – Time Zones - The International Date Line.

UNIT- II: LIGHT AND OBSERVATION

Inertial Frames- Elliptical Orbits -Kepler's Laws Derived TheVirial Theorem-Stellar Parallax -The Magnitude Scale - Qualitative Overview: The Wave Nature of Light - Blackbody Radiation Time and Space in Special-Relativity - Relativistic Momentum and Energy- Doppler Effect of Light.Telescopes: Optical Telescopes-Short Overview of Radio Telescopes - Infrared, Ultraviolet, X-ray, and Gamma-Ray Astronomy.

UNIT - III: THE STARS

Thermonuclear Energy- A Model of the Sun - Solar Neutrinos - The Photosphere - The Chromosphere - The Corona - Sunspots - The Sunspot Cycle - The Active Sun.

Stellar Evolution: Models and Observations-The Evolution of a Star-The Stellar Evolution Cycle - Brief overview: Protostars-Giantstars- Death of Stars-Planetary Nebulae-White Dwarfs- Exploding White Dwarfs- Novae-Chandrasekhar Limit-Supernovae-Neutron Stars-Black Holes.

UNIT - IV: STELLAR PHYSICS

The Classification of Binary Stars- Mass Determination Using Visual Binaries - The Formation of Spectral Lines– The Hertzsprung-Russell Diagram - Mass Continuity - Radiative Energy Transport - Energy Conservation - The Equations of Stellar Structure - Opacity – Scaling Relations on The Main Sequence - Nuclear Energy Production - Nuclear Reaction Rates - Solution of The Equations of Stellar Structure - High Energy Phenomena - Novae And Supernovae - Pulsars - Quasars - Gamma ray bursts - Accreting black hole.

UNIT – V: COSMOLOGY

Mass and Motions in the Milky Way-The Galactic Centre and Edge-Density Waves and Spiral Arms- Early Observations of Galaxies- Distances of Galaxies-Hubble's Law - Olbers' Paradox -Universal gravitation -- The Age Of The Universe - Expansion In A Newtonian World - Thermal History of the Universe - The Early Radiation Era - Photon and Lepton Decoupling - Big Bang-Nucleosynthesis.

TEXT BOOKS

1. Bradley W. Carroll, Dale A. Ostlie, *An Introduction to Modern Astrophysics*, 2nd Edition, Pearson, 2013.
2. Stephen E. Schneider , Thomas T. Arny, *Pathways to Astronomy*, 4th Edition, McGraw-Hill Education, 2014.

REFERENCES

1. Matts Roos, *Introduction to Cosmology*, 3rdEdition, John Wiley andSons Ltd, 2003.
2. Dinah L. Moché, *Astronomy: A Self-Teaching Guide*, 7th Edition, JohnWiley and Sons, 2009.
3. Linda S. Sparke, and John S. Gallagher, 2nd Edition, *Galaxies in the Universe: An Introduction*, Cambridge University Press, 2007.
4. Richard A. Matzner, Dictionary of Geophysics*, Astrophysics andAstronomy*, 2ndSeries, CRC Press, 2001.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

Subject Code	**Subject Title**	**L**	**T**	**P**	**Total of L+T+P**	**C**
UES18501	**ENVIRONMENTAL STUDIES**	**3**	**0**	**0**	**3**	**3**

INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:		**Student Outcomes**				
1.	To gain knowledge on the importance of natural resources and energy	**a**			**g**	
2.	To understand the structure and function of an ecosystem		**b**		**h**	
3.	To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation and appreciate the concept of interdependence				**f**	
4.	To understand the causes of types of pollution and disaster management			**e**		**j**
5.	To observe and discover the surrounding environment through field work				**m**	**n**

UNIT – I: INTRODUCTION TO NATURAL RESOURCES/ENERGY

Natural Resources – Definition – Scope and Importance – Need for Public Awareness – Renewable and Non–renewable Resources: Natural resources and associated problems. Forest resources and over–exploitation – Water resources and over–utilization – Mineralresource extraction and its effects – Food resources – food problems and Modern agriculture – Energy resources and its future.

UNIT – II: ECOSYSTEMS

Concept of an ecosystem–structure and function of an ecosystem–producers, consumers and decomposers– ecological succession– food chains(any 2 Examples)– food webs(any 2 Examples)–ecological pyramids.

UNIT – III: ENVIRONMENTAL POLLUTION /DISASTER MANAGEMENT

Definition–causes, effects and control measures of: Air, Water and Soil pollution– e–waste management– Disaster management: Natural and man made– food/earthquake/cyclone, tsunami and landslides.

UNIT – IV: SOCIAL ISSUES AND THE ENVIRONMENT

Sustainable development– Climate change: global warming, acid rain, ozone layer depletion and nuclear radiation– Environment Protection Act (any 2) air, water, wildlife and forest.

UNIT – V: HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations – Population explosion—Family Welfare Programme – Environment and human health – Human rights – Value education – HIV/AIDS – Women and Child Welfare – Role of Information Technology in environment and human health.

FIELD WORK

Students will visit any one of the following place of interest and submit a written report by the end of the semester:

1. Visit to a hospital/industry/canteen for solid waste management
2. Visit to a chemical industry to study about the practices followed there for waste disposal
3. Visit to Vandalur zoo for study of animal conservation/plants– flora and fauna
4. Study of simple ecosystems–lake/hill slopes
5. Naming the trees in the campus at SRM
6. Study of common plants, insects, birds in the neighbourhood
7. Study of common diseases and their prevention

8. Optional: Street plays and rally for awareness of obesity/diabetes/ vitamin D deficiency/health issues/ waste management/ solid waste management/ no plastics/ energy consumption/wild life protection.

REFERENCES

1. Bharucha Erach, (2013), Textbook of Environmental Studies for Undergraduate Courses (Second edition). Telangana, India: Orient BlackSwan.
2. Basu Mahua, Savarimuthu Xavier, (2017), SJ Fundamentals of Environmental Studies. Cambridge, United Kingdom: Cambridge University Press.
3. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
4. De A.K., Environmental Chemistry, Wiley Eastern Ltd.

E–BOOK

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380013, India, Email:mapin@icenet.net (R)

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

SEMESTER VI

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18601	NUCLEAR PHYSICS	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To study the basic characteristics of nucleus and nuclear properties	a	b			
2	To understand the concepts of nucleus structure	b	c			
3	To study interaction of nuclear particle and their decays	b	e	f		
4	To study the basics principles of acceleration and detection of nuclear particles	b	e	f		

UNIT – I: NUCLEAR PROPERTIES

Constituents of nucleus and their Intrinsic properties – quantitative facts about size – mass – charge density (matter energy) – binding energy (B.E.) – average binding energy and its variation with mass number – main features of B.E. vs Mass Number curve – Neutrons vs Nucleons plot – angular momentum – parity – magnetic moment – electric moments.

UNIT – II: NUCLEAR MODELS

Properties of nuclear forces and saturation – Non–existence of electrons in the nucleus and neutron proton model – Assumptions of liquid drop model – semi–empirical mass formula – conditions of nuclear stability – Nuclear Shell Model – Experimental evidence of magic numbers and its explanation.

UNIT – III: NUCLEAR PROCESSES

Radioactivity: Alpha emission – qualitative discussion of alpha spectra – Geiger–Nuttal rule – Beta emission – qualitative discussion of beta spectra–positron emission – electron capture – Neutrino hypothesis of beta decay – Evidence of existence of Neutrino – gamma–ray emission – qualitative discussion of gamma–ray spectra – internal conversion. Interaction with Matter: Energy loss due to ionization (Bethe–Bloch formula) – Energy loss of electrons – Gamma–ray through matter – pair production– radiation loss by fast electrons – electron–positron annihilation. Reactions: Conservation principles in nuclear reactions – Q–values and thresholds– nuclear reaction cross–sections – examples of different

types of reactions and their characteristics– Bohr's postulate of compound nuclear reaction.

UNIT – IV: ACCELERATION AND DETECTION

Accelerators: Cyclotron – Van–de–graaff generator – Qualitative discussion of Synchrotron – Linear accelerators.Detectors: Ionization chamber – G.M. counter – Basic principle of Scintillation Detectors and construction of photo–multiplier tube (PMT) – Semiconductor Detectors (Si and Ge) for charge particle and photon detection.

UNIT – V: INTRODUCTION OF ELEMENTARY PARTICLES

Elementary particles and their classification – types of fundamental interactions – Conservation laws and quantum numbers – concepts of isospin – strangeness – charge conjugation – antiparticles– introduction to quarks – leptons – hadrons – qualitative discussion of the quark model.

TEXT BOOKS

1. Mittal, V.K., Verma R.C. and Gupta S.C,*Introduction to Nuclear and Particle Physics,* PHI Learning, 3rd Edition, 2013
2. Kaplan, I.,*Nuclear Physics*, Narosa Publishers, 2002.
3. Ghoshal S.N.,*Nuclear Physics,* S. Chand, 2nd Edition, 1994.

REFERENCES

1. Segre E., *Nuclei & Particles*, W.A. Benjamin Inc., 1965.
2. Krane K. S., *Introductory Nuclear Physics*, John–Wiley, 1987.
3. Cohen, B.L., *Concepts of Nuclear Physics*, TMH Edition, 1971.
4. Verma, J.,*Fundamentals of Nuclear Physics,* CBS, 2013

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18602	MICROPROCESSORS AND MICROCONTROLLERS	4	0	0	4	4
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				Students Outcomes		
1	To understand the architecture of 8085, 8086 and 8051	a	b	c		
2	To impart knowledge on instruction sets	b	c	e		
3	To understand data transfer schemes and applications	b	e	f		
4	To develop skill in writing simple program for 8085, 8086 and 8051	b	e	f	g	h

UNIT – I: ARCHITECTURE OF 8085

Introduction to microprocessor and microcontrollers - General purpose of computer systems - Basic block diagram - Architecture of embedded system - classification and features of 8085 - Architecture of 8085–Organization of 8085–Control – Data and Address buses–registers in 8085–Addressing modes in 8085– Pin configuration of 8085.

UNIT – II: INSTRUCTION SET AND PROGRAMMING OF 8085

Instruction and operation code of 8085–Instruction types(based on number of bytes, operation), data transfer –Arithmetic–Logical–Branching–Stack and I/O instructions–Timing and sequencing instruction cycles–Machine cycle of weight state–timing diagram of opcode fetch–Memory read and memory write cycles. – Simple programs using arithmetic and logical operations – Instructionclassification - stacks and its implementation - interrupts – Maskable–Non maskable – Hardware, Software and multilevel interrupts.

UNIT –III DATA TRANSFER SCHEMES AND APPLICATIONS

Programmed data transfer scheme–Synchronous and Asynchronous and serial data transfer schemes–Interfacing devices–Types of interfacing devices–Programmable Peripheral Interface (PPI– 8255)– Communication interfacing device (Universal Synchronous Asynchronous Receiver Transmitter (USART–8251)– Programmable Direct Memory Access(DMA) controller (8257).

UNIT –IV: ARCHITECTURE AND PROGRAMMING OF 8086

Architecture–Memory organization–Input and output structure–Programmable hard ware resistors–Addressing modes–Minimum and maximum modes–Systems bus timing–Interrupts and interrupts service routines– Assembler instruction format–Data transfer instructions–Arithmetic and logical instructions–Branch instructions–processor control instructions–String operator instructions–Simple programs

UNIT – V: ARCHITECTURE AND PROGRAMMING OF MICROCONTROLLER 8051

Introduction –Comparison between microprocessor and microcontroller–architecture of 8051–Key features of 8051–Memory organization–Data and program memory–Internal RAM organization– Internal ROM organization –Special function registers–Accumulator–Data pointer–Control registers–I/O port–Counters and timers–Interrupt structures- Instruction set of 8051–Arithmetic–Logical–Data movable–Jump and call instructions– Addressing modes–Immediate–Register–Direct and indirect addressing modes–Assembly language programming–Simple programs

TEXT BOOKS

1. Ramesh S Goankar*, Micro Processor Architecture,* Programming and Applications with the 8085, 6thEdition, Penram International Publishing (India) Pvt. Ltd., 2011.
2. Kenneth J. Ayala, The 8051 *Microcontroller*, 3rdEdition, Publisher Cengage Learning, 2007.

REFERENCES

1. Anokhsingh, A.K. Chhabra, *Fundamentals of Digital Electronics and Microprocessors,* S.Chand, 2011.
2. Mazidi, The 8051 *Microcontroller And Embedded Systems*, 2ndEdition, Pearson Education India, 2007.
3. Kenneth J.Ayala, *The Microprocessor 8086 Programming and Interfacing*, West Publishing Company, 1995.
4. Barry B.Bery, Intel *Microprocessor: Architecture*, Programming and Interfacing– 8086, 8088,80186,80286,80386 and 80486, Prentice Hall PTR Upper Saddle River, NJ, 1993.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	Assessment Tool	Cycle Test I	Cycle Test II	Model Examination	Assignment	Attendance	Total
	Marks	10	10	20	5	5	50%
End Semester Weightage							50%
Total							100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18603	ELEMENTS OF NANOSCIENCE AND NANOTECHNOLOGY	4	0	0	4	4

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To make the student understand the basic concepts in nanoscience.	a	b	c		
2	To enable the student to explore the field of nanomaterials.	b	c	e		
3	To make the student understand the principles of nanotechnology	b	e	f		
4	To acquire knowledge on the various applications of nanotechnology.	b	e	f		h

UNIT – I: BASICS OF NANOSCIENCE

Nano revolution of the 20th century – Difference between bulk and nanoscale materials and their significance – Properties at the nanoscale – Optical property – Magnetic property and electronic property – Size dependent behavior – Scaling – Mechanical properties of Nano materials and Chemical properties of Nanoparticles.

UNIT– II: CLASSES OF NANOMATERIALS

Metals and Semiconductor Nanomaterials – Quantum dots – Nano wells – Nano ribbons and Nano Wires – Bucky balls – Carbon nanotubes – Single walled and Multi walled CNT–Structure – Synthesis– Properties– Functionalization and applications – Fullerenes/Bucky Balls/ C60– Synthesis – Properties – Functionalization and application

UNIT – III: SYNTHESIS OF NANOMATERIALS

Top–down approach – Nanolithography – Soft lithography and hard lithography – Physical Vapor deposition (PVD) – Chemical Vapor Deposition(CVD) – E–beam lithography – Bottom–up approach– Sol–gel processing and chemical methods – Self assembly.

UNIT – IV: CHARACTERIZATION OF NANOMATERIALS

Scanning Electron Microscope (SEM) – Transmission Electron Microscope (TEM) – Atomic Force Microscope (AFM) – Scanning Tunneling Microscopy (STM) – Types– Manipulating atoms and Molecules with STM – Scanning Tunneling Spectroscopy and Dip pen Nanolithography.

UNIT – V: APPLICATIONS OF NANOTECHNOLOGY

Nanotechnology in Energy systems – Electronics – Environment – Space and Aviation – Textiles – Food and Agriculture – Automotive Industry – Solar Technology – Chemical engineering – Building and Construction – Biotech and Biomedical Engineering – Pharmaceutical and drugs – Molecular Nanoelectronics

TEXT BOOKS

1. Pradeep T, *Fundamentals of Nanoscience and Nanotechnology,* Mc Graw Hill, 2012.
2. Chris Binns, *Introduction to Nanoscience and Nanotechnology,* 1st Edition, Willey– Publication, 2010.

REFERENCES

1. Gabor L.Hornyak, H.F.Tibbals, Joydeep Dutta, John J.Moore, *Introduction to Nanoscience and Nanotechnology*, CRC Press, 2008.
2. Chattopadhay K.K., *Introduction to Nanoscience and Nanotechnology–,* APH Publishing Corporation, 2006.
3. Robert W. Kelsall, Ian W. Hamley and Mark Geoghegan*, NanoscaleScience and Technology*, John Wiley and Sons, Ltd., 2005.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18604	MICROPROCESSORS LABORATORY	0	0	4	4	2
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				Students Outcomes		
1	To understand the basic operations of 8085, 8086 and 8051	a	d	h	i	
2	To impart knowledge on code conversions with 8085 and 8051	a		h	i	
3	To understand temperature conversions logic with 8085 and 8051	a		h	i	
4	To develop skills in 8085 interfacing.	a		h	i	n

LIST OF EXPERIMENTS (Any 9 Experiments)

1. Perform the Arithmetic operations (addition and Subtraction) using microprocessor 8085.
2. Perform the Arithmetic operations (multiplication and division) using microprocessor 8085.
3. Code conversion using microprocessor 8085.
4. Temperature conversion using microprocessor 8085.
5. Decimal counters using microprocessor 8085.
6. Perform the Arithmetic operations (addition and Subtraction) using microprocessor 8086.
7. Perform the Arithmetic operations (multiplication and division) using microprocessor 8086.
8. Perform the Arithmetic operations (addition and Subtraction) using microcontroller 8051.
9. Perform the Arithmetic operations (multiplication and division) using microcontroller 8051.
10. Code conversion using microcontroller 8051.
11. Temperature conversion using microcontroller 8051.
12. Decimal counter using microcontroller 8051.
13. Programmable Peripharal Interfacing (PPI– 8251) – Mode 0 and Mode 1 operations using microprocessor 8085.
14. Traffic light control systems using microprocessor 8085.
15. Stepper motor control using microprocessor 8085.

TEXT BOOKS

1. Ramesh S Goankar, *Micro Processor Architecture*, Programming & Applications with the 8085, 6th Edition, Penram International Publishing (India) Pvt. Ltd., 2011.
2. Kenneth J. Ayala, *The 8051Microcontroller,* 3rd Edition, Publisher Cengage Learning, 2007.

REFERENCES

1. Anokhsingh, A.K. Chhabra, *Fundamentals of Digital electronics and Microprocessors,* S.Chand, 2011.
2. Mazidi, The 8051 *Microcontroller and Embedded Systems*, 2ndEdition, Publisher Pearson, Education India, 2007.
3. Kenneth J.Ayala, *The Microprocessor 8086 Programming and Interfacing,* West Publishing Company, 1995.
4. Anokhsingh, A.K. Chhabra, *Fundamentals of Digital Electronics and Microprocessors,*S. Chand, 2011.

COURSE NATURE: PRACTICAL						
Assessment Method-Practical Component (Marks: 100)						
In-semester	**Assessment tool**	**Experiments**	**Observation**	**Regularity**	**Model Examination**	**Total**
	MARKS	**25**	**10**	**5**	**10**	**50%**
End Semester Weightage						**50%**
Total						**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18C07	**COMPUTATIONAL PHYSICS**	**3**	**0**	**0**	**3**	**3**
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				**Students Outcomes**		
1	To understand the basic programming techniques in MATLAB	**a**	**b**	**c**		
2	To understand various numerical techniques	**b**	**c**	e		
3	To implement simple numerical problems in Physics using MATLAB	**b**	**e**	**f**	**g**	
4	To familiarize with the basic commands in MATLAB	**b**	**e**	**f**	**g**	

UNIT – I: INTRODUCTION

Different kinds of errors – Error and precision in basic arithmetic operations – Truncation and round off errors – Error propagation in arithmetic operations – Methods for reducing errors – Matrices and basic matrix operations (addition, subtraction, multiplication, inversion and transpose) – Determinant of matrix – solving simultaneous linear equations using matrix.

UNIT – II: INTRODUCTION TO MATLAB

Creating variables – Operator precedence – Data types – Workspace management –Managing MAT files – Using Matlab help – Handling arrays and matrices –Matrix indexing – Matrix dimensions – Colon operator – Adding and deleting rows and columns in matrix – Sub matrix –Functions to generate elementary matrices – Matrix arithmetic operations – Matrix transpose operation – Vector operations – Solving simultaneous linear equation using matrix method using MATLAB. Importing and exporting data – Plotting graphs (plot, mesh and surf commands) – Plotting multiple data sets in single plot – Handling axes, legends, labels, title, scale colors, and other graph properties – Plotting in linear scale and log scale – Exporting plots as EPS file – Basics of 2D and 3D plots.

UNIT – III: PROGRAMMING IN MATLAB

M file – Creating, running a simple script – Control flow in Matlab –if statement, if–else – nested if–else – Logical operators – Looping – while loop, for loop, Nesting of loop– switch, break and continue statements –Functions in Matlab – User defined functions with examples – difference between script and user defined function – Debugging M files –Setting and handling break points –Reading data from a file – writing data to a file.

UNIT – IV: NUMERICAL METHODS IN MATLAB

Interpolation – with linear, spline and cubic interpolations – Line fitting – Curve fitting –Numerical integration in one dimension – Discrete Fourier Transform – Fast Fourier Transform – Inverse Fast Fourier Transform.

UNIT – V: MATLAB FOR SOLVING NUMERICAL PROBLEMS

Motion in one dimension – Motion of free falling object – Falling of a body in a viscous medium – Projectile motion (by Euler method)–Motion under an attractive Inverse Square – Fourier generation of a square wave.

TEXT BOOKS

1. Rizwann Butt, *Introduction to Numerical Analysis using MATLAB*, Jones and Bartlett Publishers, 2008.
2. Rap V. Dukkipati, *Applied Numerical Methods using MATLAB*, New Age International Publishers, 2011

REFERENCES

1. Sastry S.S., *Introductory Methods of Numerical Analysis*, Prentice Hall of India, 2005.
2. James B Scarborough, *Numerical Mathematical Analysis*, Oxford and IBH Publishing Company, 1966.
3. Koonin, Steven E., and Dawn C. Meredith, *Computational Physics*. Addison–Wesley, 1990.
4. Thijssen Jos, *Computational Physics,* Cambridge University Press, 2007.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18C08	**NONLINEAR OPTICS**	**3**	**0**	**0**	**3**	**3**

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				**Students Outcomes**		
1	To provide the learners with a full–fledged understanding of integrated optics so that they may be able to develop the sound theoretical and experimental tools to study and control the linear and non–linear optical properties of various optical components.	**a**	**b**	**c**		
2	To understand and discuss non–linear equations required for the simple and complexed situations and present a lecture on a topic within: nonlinear optics.	**b**	**c**	e		

3	To carry out smaller research type projects based on contemporary and modern photophysical phenomena involved in NLO materials and analyse and present the achieved results in form of posters an oral presentation and a technical article.	**b**	**e**	**f**		
4	To understand and perform simple evaluations of nonlinear phenomena in optics.	**b**	**e**	**f**	**g**	

UNIT – I: INFORMATION IN LIGHT

Light In The Era Of Electronics – Electronics1900–1960 – Principles of Optical Telegraphy – Photophone –Early rectification devices – The solid–state rectifier – The transistor – New semiconductors for optoelectronics – Optoelectronic semiconductor devices – Bright light from cool solids – Seeing The Light– The human eye – Color vision – Color blindness – Polarization sensitivity – Speed of response – Optical illusions – Contemporary Optics– Waveguides – Optical fibres – Optical amplification – Conveying sound by light – The long and the short of optical communication.

UNIT – II: FUNDAMENTAL TOOLS

Electromagnetic Phenomena – Gauss' Law – Gauss Law For Magnetic Fields – Faraday's Law – Ampere's Law – Maxwell's Adjustment To Ampere's Law – Polarization of Materials – Plane Wave Solutions To The Wave Equation – Complex Plane Waves – Real And Complex Indices of Refraction – The Lorentz Model of Dielectrics – Poynting's Theorem – Irradiance of A Plane Wave – Energy Density of Electric And Magnetic Fields.

UNIT – III: PHOTOPHYSICAL PHENOMENA

Optical Propagation in Media – Diffraction and Dispersion effects – Wave Propagation in Homogeneous Linear Isotropic Media – Anisotropic media – The Origin and Modeling of Optical Nonlinearity – A Simple Physical Model for Optical Nonlinearity – Physical Effects of Nonlinear Polarization – Mathematical Modeling of Optical Nonlinearities – An Alternative Approach For Reflection And Refraction:–Refraction at an Interface – The Fresnel Coefficients' – Reflectance – Transmittance – Double–Interface Problem Solved Using Fresnel Coefficients' – Beyond Critical Angle: Tunneling of Evanescent Waves – Multiple Interfaces – Multilayer Coatings.

UNIT – IV: PHYSICS OF NON–LINEARITIES

The Physics of Second Harmonic Generation – SHG in Crystals – Frequency Doubling and Mixing – Optical Parametric Generation Amplification – Oscillation – Mathematical Formulation – Phase Matching in Anisotropic Crystal – Nonlinear Transverse Effects in Second Harmonic Generation – Self–Refraction of Optical/Gaussian Beams – Optical Bistability phenomena – Optical Phase conjugation effects.

UNIT – V: OPTICAL COMMUNICATION TODAY

Components – Fabrication And Materials – Light Sources – Coupling– Micro Components Tapers – Splices/Connectors – Characteristics of optical fibers – Diameter Control And Measurement – Attenuation – NLO Properties In Media – Fiber–Optic Solitons – Magnetic Solitons – Optical Shocks And Self–Steepening Of Pulses – Two–Wave Mixing In Photorefractive Materials – Four–Wave Mixing And Phase Conjugation In Photorefractive Materials – Self–Phase Conjugation And Edge Enhancement – Non–Linearities In Nematic Liquid Crystals – Photonic Bandgap Structures

TEXT BOOKS

1. Sergey A. Ponomarenko, *Fundamentals of Nonlinear Optics ECED 6400Lecture Note*s, Dalhousie University, 2012.
2. Goure P and Verrier I, *Optical Fibre Devices Series in Optics and Optoelectronics,* Institute of Physics Publishing Ltd, 2002.

REFERENCES

1. Justin Peatross and Michael Ware, *Physics of Light and Optics,* 2013.
2. David A. Boas, Constantinos Pitris and Nimmi Ramanujam, *Handbook of Biomedical Optics,* CRC Press, Taylor and Francis Group, 2011.
3. David Greene, *Light and Dark* Institute of Physics Publishing Ltd, 2003.
4. Richard L Sutherland, *Handbook of Nonlinear Optics, 2nd Edition (Revisedand Expanded),* Marcel Dekker, Inc, 2003.

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18C09	SEMICONDUCTOR DEVICE PHYSICS	3	0	0	3	3

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To outline the classification of solids as metals, semiconductors, and insulators and distinguish direct and indirect semiconductors	a	b	c		
2	To elucidate the importance of Quantum theory and its related principles	b	c			
3	To know the physics of semiconductor junctions, metal–semiconductor junctions and metal–insulator–semiconductor junctions and related device operations	b	c	e		
4	To understand the fabrication technology and principles of operation of new and future electronic and photonic devices based on semiconductors	b	e	f		

UNIT – I: STRUCTURAL PROPERTIES OF SEMICONDUCTORS

Crystal Structure –Space lattices – Primitive and unit cell– Types of crystal structures – Crystal planes and Miller Indices– Energy Bands and origin of Energy Gap – Carrier Concentration at Thermal Equilibrium – Carrier–Transport Phenomena – Phonon, Optical, and Thermal Properties of solids – Imperfections in Solids

UNIT – II: QUANTUM THEORY OF SOLIDS

Principles of quantum mechanics – wave particle duality – de–Broglie hypothesis – The uncertainty principle – The physical meaning of Schrodinger's Wave equation – Boundary conditions – Applications of Schrodinger's wave equation – the Infinite Potential well– the Step Potential Function – allowed energy bands– forbidden zones–

UNIT – III: DEVICE BUILDING BLOCKS

Homo and Heterojunctions – Depletion Region – Current–Voltage Characteristics – Junction Breakdown – Transient Behavior and Noise – Terminal Functions – Heterojunctions – Formation of barriers – Current Transport Processes – Measurement of Barrier Height – Device Structures – Ideal MIS Capacitor – Silicon MOS Capacitor

UNIT – IV: TRANSISTORS AND POWER DEVICES

The Basic Principle of Operation – Simplified Transistor Current Relations– The Modes of Operation – Amplification with Bipolar Transistors –Static Characteristics – Microwave Characteristics – Device Scaling and Short–Channel Effects – Nonvolatile Memory Devices – JFETs, MESFETs, and MODFETs –Tunnel Devices – IMPATT devices – Real–Space–Transfer Devices.

UNIT – V: OPTICAL DEVICES

Optical Absorption –Photon Absorption Coefficient – Electron–Hole Pair Generation Rate – Emission processes –Photoluminescence and Electroluminescence –Basic Transitions – Luminescent Efficiency – Materials – Solar Cells – The PN Junction Solar Cell – Conversion Efficiency and Solar concentration– Non–uniform Absorption Effects – Amorphous Silicon Solar Cells – Tandem cells– Photodetectors– Photoconductors–phototransistors

TEXT BOOKS

1. Donald A. Neamen, *Semiconductor Physics and Devices – Basic Principles,* 3rd edition, *McGraw–Hill Higher– Education 2003.*
2. S M Sze, *Physics of Semiconductor Devices,* 2nd edition, John Wiley & Sons, Inc 2007.

REFERENCES

1. Peter YU, *Fundamentals of Semiconductors: Physics and Materials Properties* (Graduate Texts in Physics), 4th edition,2010.
2. Jacques I Pankove, *Optical Processes in Semiconductors* 2nd edition, Dover Books on Physics, 2010.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	Total	C
UPY18605	CORE BASED PROJECT	0	0	8	8	4

Project Work Evaluation

Internal Assessment: 50 Marks

Assessment Tool	Marks
First Review (Abstract)	10
Second Review	10
Final Review	20
Attendance	10

External Examination: 50 Marks

Assessment Tool	Marks
Report and Presentation	10
Analysis	10
Findings and Conclusion	20
Viva-Voce	10

Subject Code	Subject Title	L	T	P	Total L+T+P	C
CAC18601	COMMUNICATION SKILLS	2	0	0	2	2

COURSE OBJECTIVE

To inculcate professional ethics and improve employability skills

	INSTRUCTIONAL OBJECTIVES At the end of this course the learner is expected:	Student Outcomes					
1.	To actively participate in formal discussions and manifest professional skills such as working in team, empathy, communicating appropriately and assertiveness	d	e	f	h	m	n
2.	To foster problem solving and decision making skills through case studies on work ethics, decision making, organizational behavior etc.,	d	e	f	h	m	n
3.	To build confidence to face audience and overcome stage fear with necessary training in public speaking and presentation skills	d	e	f	h	m	n
4.	To develop written business communication skills	d	e	f	h	m	n

UNIT – I

Etiquettes– social, professional, communication, dinning and grooming etiquettes

UNIT – II

Interpersonal skills– Empathy, Managing conflicts, Effective decision making

UNIT – III

Team work– Role of leader and effective leadership, Role of team members and team ethics,Case study analysis (in teams) to understand team dynamics

UNIT – IV

Professional writing– Report, Letter, Summary and e–mail

UNIT – V

Presentation skills– Importance of verbal and non–verbal communication, Body language, Use of appropriate language

TEXT BOOK

1. 'How to deliver a presentation' By Paul Newton; e–book
2. 'A–Z of Presentation' By Eric Garner; e–book

REFERENCES

1. 'Emotional Intelligence' By Daniel Coleman

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18A01	ALLIED PHYSICS – I	4	0	0	4	4

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To understand the fundamentals of physics	a	b	c		
2	To give the basic understanding of material properties	b	c	e		
3	To educate and motivate the students in the field of science	b	c	e	f	
4	To acquire knowledge on magnetism and dielectrics	b	e	f	f	

UNIT - I: SIMPLE HARMONIC MOTION AND CIRCULAR MOTION

Time period – Amplitude – Phase – Spring mass system – Simple pendulum – Composition of two simple harmonic motions of equal periods in a straight line and at right angles – Lissajous figures – Damping force – Damped harmonic oscillator – Uniform circular motion – Acceleration of a particle in a circle – Centripetal and centrifugal forces – Banking on curved roads.

UNIT - II: PROPERTIES OF MATTER

Elasticity and plasticity – Elastic constants – Bending of beams – Young's modulus by non – Uniform bending – Torsion in a wire – Determination of rigidity modulus of torsion pendulum – Viscosity – Coefficient of viscosity – Stoke's law – terminal velocity – Surface tension – Molecular theory of surface tension – Excess pressure inside a drop and bubble.

UNIT - III: HEAT AND THERMODYNAMICS

Kinetic theory of gases – Basic postulates – Ideal gas laws – Van Der Waal's equation of states – Pressure of an ideal gas – Laws of thermodynamics – Entropy – change of entropy in reversible and irreversible processes – Low temperature – Joule – Kelvin effect – Theory and applications – Liquefaction of gases – Linde's process – Adiabatic demagnetization.

UNIT - IV: ELECTRICITY AND MAGNETISM

Electric charge – Conservation of charge – Permittivity – Coulomb's law – Electric field – Electric potential – Gauss's law and its applications – Conductors – Dielectrics – Electric Current – Ohm's law – Magnetic induction – Permeability

– Susceptibility – Magnetic field due to a current carrying conductor – Biot Savart's law – Field along the axis of a coil – Force on a conductor carrying current in a magnetic field – Ampere's circuital law – Faraday's law – Gradient – Curl and Divergence – EM waves.

UNIT - V: GEOMETRICAL OPTICS

Light and Optics – Fermat's principle – Laws of reflection and refraction – Total internal reflection and its illustrations – Mirrors and lenses – Lens formula – Refraction through a prism – Combination of two prisms to produce dispersion without deviation and deviation without dispersion – Defects of images – Coma distortion – Spherical and chromatic aberration in lenses.

TEXT BOOKS

1. Resnick R. and Halliday D., *Fundamentals of Physics*, Wiley Publication, 8th Edition, 2011.
2. Sundaravelusamy A., *Allied Physics I*, Priya Publications, 2009.

REFERENCES

1. Naik P.V., *Principles of Physics*, PHI Learning Pvt. Ltd, 2006.
2. John Thiruvadigal D., Ponnusamy S., Sudha L. and Krishnamohan M., *Physics for Technologists*, Vibrant Publication, 2013.
3. Rajam J. B., *Physics for Technologists*, S. Chand, 1981.
4. Brijilal and Subramanian, *Elements of Properties of Matter*, S. Chand Limited, 2014 (Reprint).

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18A02	ALLIED PHYSICS LABORATORY–I		0	3	3	2
INSTRUCTIONAL OBJECTIVES: **At the end of this course the learner is expected:**			**Students Outcomes**			
1	To acquire basic understanding of laboratory techniques	a	d	h	i	
2	To educate the basics of instrumentation, data acquisition and interpretation of results	a		h	i	
3	To educate and motivate the students in the field of science	a		h	i	
4	To allow the students to acquire knowledge of fundamentals of optics	a		h	i	n

List of Experiments:

1. Determination of Young's Modulus– Uniform bending Method
2. Determination of Young's Modulus– Non Uniform bending Method
3. Determination of Rigidity Modulus of a wire – Torsional pendulum
4. Determination of thermal conductivity of a bad conductor using Lee's disc method
5. Calibration of Voltmeter using potentiometer
6. Calibration of Ammeter using potentiometer
7. Determination of magnetic susceptibility using Quincke's Method
8. Determination of dispersive power of a prism using spectrometer
9. Determination of Cauchy's constant using spectrometer

TEXT BOOKS

1. C.H. Bernard and C.D. Epp, John, *Laboratory Experiments in College Physics,* Wiley and Sons, Inc., 1995.
2. F.A. Jenkins and H.E. White, *Fundamentals of Optics*, 4th Ed., McGraw–Hill Book Co., 1981.

REFERENCES

1. G. L. Squires, *Practical Physics*, Fourth edition, Cambridge University Press, 2001.
2. D. Halliday, R. Resnick and J. Walker, *Fundamentals of Physics*, 6th Ed., John Wiley and Sons, Inc., 2001.

3. F.A. Jenkins and H.E. White, *Fundamentals of Optics*, 4th Ed., Reprint McGraw–Hill Book Co., 2007.
4. GeetaSanon, B. Sc., *Practical Physics*, 1st Edition. R. Chand & Co, 2007.

COURSE NATURE: PRACTICAL						
Assessment Method-Practical Component (Marks: 100)						
In-semester	**Assessment tool**	**Experiments**	**Observation**	**Regularity**	**Model Examination**	**Total**
	MARKS	**25**	**10**	**5**	**10**	**50%**
End Semester Weightage						**50%**
Total						**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18A03	**ALLIED PHYSICS – II**	**4**	**0**	**0**	**4**	**4**
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To understand the fundamentals of physics	**a**	**b**	**c**		
2	To emphasize the significance of Green technology and its applications	**b**	**c**	e		
3	To understand the structural, optical, nuclear and electronic properties of solids	**b**	**c**	**e**	**f**	
4	To acquire knowledge on elementary ideas of integrated circuits	**b**	**e**	**f**	**f**	

UNIT - I: RENEWABLE ENERGY PHYSICS

Sources of conventional energy – Need for non – Conventional energy – Resources – Solar energy – Solar cells and its applications – Wind energy – Generation and applications – Bio mass energy – Generation and applications – Geothermal energy – Generation – Applications – Tidal energy – Generation and applications.

UNIT - II: MODERN PHYSICS

Atomic structure – Alpha, beta and gamma radiation – Law of radioactive decay – Decay constant – Half life – Mean life – Nuclear energy – Mass defect – Binding energy – Fission and fusion – Biological effects of radiation – Black body radiation – Planck's quantum hypothesis – Photoelectric effect – Compton effect – De Broglie equation – Uncertainty principle.

UNIT - III: WAVE AND FIBRE OPTICS

Wave nature of light – Huygens's principle – Interference – Young's double slit experiment – Coherence – Interference from thin films – Michelson's interferometer. Diffraction – Wave theory of light – Single slit experiment – Diffraction grating – Polarization – Fiber optics – Propagation of light in optical fiber – Acceptance angle – Numerical aperture – Attenuation – Types of optical fibers and its Applications.

UNIT - IV: CRYSTAL PHYSICS

Space lattice – Basis – Unit Cell – Lattice parameters – Two dimensional and three dimensional Bravais lattices and Crystal systems – Cubic crystal system – Crystal symmetry – Reciprocal lattice and its importance – Density and atomic packing fraction – Directions – Planes and Miller indices – Interplanar distance – Hexagonal Closely Packed (HCP) structure – Crystal imperfections – X ray diffraction – Laue method – Single crystal and powder diffraction.

UNIT - V: ELECTRONICS

Basic Electronics – P and N type semiconductors – Junction Diode and their characteristics – Half wave – Full wave rectifiers – Voltage regulations – Zener diode – Junction transistor – PNP – Digital electronics – AND, OR, NOT gates – NAND and NOR as universal building Blocks – Boolean algebra – Laws of Boolean algebra – De Morgan's theorem, basics of integrated circuit (IC)

TEXT BOOKS

1. Kittel C., *Introduction to Solid State Physics*, 8th Edition, Wiley Eastern Ltd, 2005.
2. Malvino and Leach, *Digital Principles & their Applications*, Tata McGraw Hill, 2010.

REFERENCES

1. Jha A.K., *Textbook of Applied Physics*, International Publishing House Pvt. Ltd, 2011.
2. Mansi Karkare and RajniBahuguna, *Applied Physics*, Volume – II International Publishing House Pvt. Ltd, 2010.
3. Tasneem Abbasi, Abbasi S. A, *Renewable Energy Sources: Their Impact on Global Warming and Pollution*, PHI Learning Pvt. Ltd. 2013.
4. Thyagarajan K. and Ajay Ghatak, *Introduction to Fiber Optics*, Cambridge, University Press, 1998.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	Assessment Tool	Cycle Test I	Cycle Test II	Model Examination	Assignment	Attendance	Total
	Marks	10	10	20	5	5	50%
End Semester Weightage							50%
Total							100%

COURSE CODE	COURSE TITLE	L	T	P	TOTAL	C
UPY18A04	ALLIED PHYSICS LABORATORY–II		0	3	3	2

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		Students Outcomes				
1	To familiarized with the concept of material properties	a	d	h	i	
2	To educate the basics of instrumentation, data acquisition and analysis	a		h	i	
3	To understand the optical and electronic properties of solids through experimentations	a		h	i	
4	To understand the instrumentation of electronics experiments	a		h	i	n

List of Experiments:

1. Study the I–V Characteristic of a Solar Cell
2. Determination of wire thickness using air wedge experiment.
3. Study of attenuation and propagation characteristics of optical fiber cable
4. Band gap determination using Post Office Box – Specific resistance
5. Band gap determination using Four Probe Method.
6. Dielectric constant Measurement
7. Hall effect– Hall coefficient determination
8. Determination of regulation properties of a given power supply using a integrated circuit (IC)
9. Construction of AND, OR, NOT gates using diodes, resistors and Transistors

TEXT BOOKS

1. S.O. Kasap, *Principles of Electronic Materials and Devices*, Tata McGraw Hill Edition, 2002
2. Thiruvadigal, J. D., Ponnusamy, S. and C.P.Kala and Krishna Mohan.M., *Materials Science*, Vibrant Publications, 2012.

REFERENCES

1. C.Ouseph, K.Rangarajan,*A Text Book of Practical Physics*, Volume I,II,S.Viswanathan Publishers,1997
2. Chauhan and Singh, *Advanced Practical Physics*, Revised Edition, PragatiPrakashan, 1985.
3. Van Vlack, L.H., *Material Science for Engineers*, 6th Edition, .Addison Wesley, 1985
4. Callister, Jr. W.D., *Materials Science and Engineering: An Introduction*, Seventh Edition, Wiley, 2007.

COURSE NATURE: PRACTICAL						
Assessment Method-Practical Component (Marks: 100)						
In-semester	**Assessment tool**	**Experiments**	**Observation**	**Regularity**	**Model Examination**	**Total**
	MARKS	**25**	**10**	**5**	**10**	**50%**
End Semester Weightage						**50%**
Total						**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18E81	**ENERGY PHYSICS**	2	**0**	**0**	**2**	**2**
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:					**Students Outcomes**	
1	To learn the fundamentals of energy sources and applications	**b**	**c**			
2	To learn photo thermal based energy systems and applications		**c**		**i**	
3	To learn basic principles and applications of photovoltaic systems		**c**	**e**	**i**	
4	To learn the concepts of energy from biomass, wind energy and other sources	**b**			**k**	**m**

UNIT -I: INTRODUCTION TO ENERGY SOURCES

World's reserve – Commercial energy sources and their availability– Conventional and non–conventional sources of energy, comparison – Coal– Oil and natural gas – applications – Merits and Demerits–Structure and characteristics of sun–Solar constant –Solar spectrum–Solar radiations outside earth atmosphere – Solar radiation at the earth surface.

UNIT -II : PHOTOTHERMAL APPLICATIONS

Basic Principles of Liquid flat plate collector –Materials for flat plate collector – Construction and working–Parameters and efficiency of solar concentrators – Advantage and disadvantage–Solar distillation–Solar disinfection – Solar drying– Solar cooker(box type).

UNIT - III: PHOTOVOLTAIC SYSTEMS

Introduction–Photovoltaic principle–Basic Silicon Solar cell– Power output and conversion efficiency–Limitation to photovoltaic efficiency–Basic photovoltaic system for power generation–Advantages and disadvantages–Types of solar cells–Application of solar photovoltaic systems – PV Powered fan – PV powered area lighting system – A Hybrid System.

UNIT – IV:ENERGY FROM BIOMASS

Introduction–Biomass conversion technologies–Bio–gas generation–Factors affecting bio–digestion –Working of biogas plant–Advantages and disadvantage of floating and fixed dome type plant–Bio–gas from plant wastes–Methods for obtaining energy from biomass–Advantages and disadvantages of biological conversion of solar energy

UNIT -V :WIND ENERGY AND OTHER ENERGY SOURCES

Wind Energy Conversion–Classification and description of wind machines, wind energy collectors–Energy storage–Wind data–energy audit– Energy and power from waves– wave energy conversion devices– Fuel cells– and application of fuel cells–batteries– advantages of battery for bulk energy storage– Hydrogen as alternative fuel for motor vehicles.

TEXT BOOKS

1. Kothari D.P., K.C. Singal and Rakesh Ranjan, *Renewable energy sources and Emerging Technologies*, Prentice Hall of India, 2008.
2. Garg H.P.and Prakash J., *Solar Energy Fundamentals and Application,* TataMcGraw – Hill Publishing, 7th*Reprint 2006.*

REFERENCES

1. Chetan Singh Solanki, *Solar Photvoltaics Fundamentals, Technologies andApplications*, 2nd Edition, PHI Learning Private Limited, 2011.
2. Rai G. D, *Non conventional Energy sources*, 4th Edition, Khanna Publishers, 2010.
3. Jeffrey M. Gordon, *Solar Energy: The State of the Art*, Earthscan, 2013.
4. Kalogirou S.A., *Solar Energy Engineering: Processes and Systems*, 2nd Edition, Academic Press, 2013.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18E82	**ELECTRICAL APPLIANCES**	2	**0**	**0**	**2**	**2**

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:		**Students Outcomes**				
1	To understand the fundamentals of electrical connections.	b	c			
2	To make the learner familiarize with working of generators and motors.		c	d	i	
3	To acquire knowledge on principles of transformer.		c	d	i	
4	To understand the working principle of electrical appliances.	b			k	m

UNIT- I :ELECTRICAL CONNECTIONS

Resistance – Capacitance – Inductance – Electrical charge – Current – Potential and measuring meters –Galvanometer– Ammeter– Voltmeter and multimeter – Electrical energy – Power – Watt – kWh – Consumption of electrical power – AC and DC– Single phase and three phase connections – RMS and peak values –

House wiring – overloading – Earthing – Short circuiting – Fuses – Colour code for insulation wires – Inverter – UPS – Generator – Motor – Circuit breaker – Electrical switches.

UNIT -II :HEATING AND WELDING

Electric heating – Modes of transfer of heat – Methods of electric heating – Resistance heating – Induction heating – High frequency eddy current heating – Dielectric heating – Resistance – Welding – Electric arc welding – DC and AC – Welding Equipment – Energy storage welding occupational hazards due to chemical reactions – Industrial heating and welding.

UNIT -III : DC Generators and Motors

Electro–mechanical energy conversion principle and EMF – Electrical machines – DC Generators – Construction and materials used for various parts of DC generator – Functions of various parts of DC Generator – Working Principle – Working principle of DC motor – back emf – Torque equation for DC motor – DC motor starters – Construction and working of DC motor starters.

UNIT-IV :PRINCIPLES AND APPLICATIONS OF TRANSFORMERS

Principle of operation – Constructional details – Core type– Shell type – Classification of transformers – EMF equation – Voltage Ratio – Current ratio – Transformer on no–load – Auto transformer – Principle – Applications. Three phase Transformer – Connections – Star – Star– Star – delta– Delta–star – Parallel operation of transformers – Load sharing – Cooling of transformers – Protective devices and accessories – Losses in transformer.

UNIT-V :DOMESTIC ELECTRIC APPLIANCES

Electrical bulbs – Fluorescent lamps – Street lighting – Flood lighting – Electrical fans – wet grinder – Mixer – Water heater – Storage and instant types – Electric iron box – induction heater– Stabilizer – Refrigerator – Microwave oven – Washing Machine – Air Conditioner.

TEXT BOOKS

1. Teraja B.L., *A Text book in Electrical Technology*, S. Chand and Co., 2005.
2. Taylor E.O., *Utilisation of Electrical Energy*, Orient Longman Private Ltd.,2006.

REFERENCES

1. Fitzgerald A. E., David E Higginbothom and Arvin Gabrel*, Basic ElectricalEngineering*, Tata McGraw–Hill Education, 2009.

2. Roman Malaric, *Instrumentation and Measurement in Electrical Engineerin*g, Brown Walker Press, 2011.
3. Clive Maxfield, John Bird, Tim Williams, Walt Kester and Dan Bensky, *Electrical Engineering: Know It All*, Elsevier Inc, 2008.
4. Despande, M.V, *Electrical Machines*, PHI Learning, 2011.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18E83	**FUNDAMENTALS OF NANOSCIENCE AND NANOTECHNOLOGY**	2	**0**	**0**	**2**	**2**

INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				**Students Outcomes**		
1	To give a general introduction to different classes of nanomaterials	**b**	**c**			
2	To familiarize various synthesis methods of nanomaterials		**c**	**d**	**e**	
3	To understand the characterization techniques involved in nanotechnology		**c**	**d**	**h**	**j**
4	To familiarize themselves with nanotechnology potentialities	**a**			**k**	**n**

UNIT –I :INTRODUCTION TO NANOTECHNOLOGY

Definition of Nano – Scientific revolution–Atomic Structure and atomic size, emergence and challenges of nanoscience and nanotechnology – carbon age– new form of carbon (CNT to Graphene) – influence of nano over micro/macro – size effects and crystals – large surface to volume ratio – surface effects on the properties.

NIT – II:TYPES OF NANOSTRUCTURES AND PROPERTIES OF NANOMATERIALS

Classification based on dimensionality–Quantum Dots, Wells and Wires– Carbon based nanomaterials –buckyballs – nanotubes – graphene – Metal based nano materials–nanogold – nanosilver – metal oxides –Nanocomposites – Nano ceramics –Biological nanomaterials –mechanical–physical–chemical properties.

UNIT – III : SYNTHESIS OF NANOMATERIALS

Chemical Methods – Metal nanocrystals by Reduction – Solvothermal Synthesis– Photochemical Synthesis – Sonochemical Routes– Chemical Vapor Deposition (CVD) – Metal Oxide – Chemical Vapor Deposition (MOCVD) – Physical Methods – Ball Milling – Electrodeposition – Green synthesis of nanoparticles using plant extracts.

UNIT –IV : CHARACTERISATION OF NANOMATERIALS

Particle size–X–ray Diffraction Peak Broadening method for crystallite size – dislocation density – strain –Photon Correlation Spectroscopy (PCS) –UV –Vis spectroscopy – Transmission Electron Microscopy–Scanning Probe Microscopy – Differential scanning calorimetry – Principle importance of thermal analysis for nanostructures.

UNIT –V : APPLICATIONS OF NANOMATERIALS

Solar energy conversion and catalysis – Molecular electronics and printed electronics –Nanoelectronics – Liquid crystalline systems – Linear and nonlinear optical and electro–optical properties – Applications in displays and other devices – Nanomaterials for data storage – Photonics, Plasmonics– Chemical and biosensors –Nanomedicine and Nanobiotechnology – Nanotoxicology challenges.

TEXT BOOKS

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill Education Pvt. Ltd.,2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*, Academic Press, 2002.

REFERENCES

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.
2. Dupas C., Houdy P., Lahmani M., *Nanoscience: Nanotechnologies and Nanophysics*, Springer–Verlag Berlin Heidelberg, 2007.
3. G. Schmidt, *Nanoparticles: From Theory to Applications*, Wiley Publications, 2004.

4. Leon L. Shaw, *Processing & Properties of Structural Nanomaterials*, Royal Society of Chemistry, Cambridge UK 2005.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
	Marks	**10**	**10**	**20**	**5**	**5**	**50%**
End Semester Weightage							**50%**
Total							**100%**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**TOTAL**	**C**
UPY18E84	**ELECTRONIC COMMUNICATION**	2	**0**	**0**	**2**	**2**
INSTRUCTIONAL OBJECTIVES: At the end of this course the learner is expected:				**Students Outcomes**		
1	To understand the basic knowledge about amplitude and frequency modulation	**b**	**c**			
2	To impart the knowledge about the transmission lines.		**c**	**d**		
3	To understand the basic idea about the television.	**b**	**c**	**d**		
4	To develop the knowledge in RADAR and digital communication systems.	**a**	**b**	**d**	**k**	

UNIT – I : AMPLITUDE AND FREQUENCY MODULATION

Modulation – Definition – Types of modulation AM–FM– PM – Expression for amplitude modulated voltage – Wave form of amplitude modulated wave – Collector modulation circuit – Single side band generation – Balanced modulator – AM transmitter – Block diagram and explanation – Frequency modulation – Expression for frequency modulated voltage – Side bands in FM– AM production by transistor modulator – Comparison of AM–FM– PM.

UNIT – II : TRANSMISSION LINES

Demodulation – Definition– Diode detection of AM signals – FM detection – Foster Seely discriminator – Radio receivers – Straight receivers – TRF receivers – Super heterodyne receivers – Block diagram – Explanation of each stage – FM receivers – Block diagram – Single and independent side band receiver– Demodulation of SSB and receiver types – Transmission Lines – Characteristics impedance – Losses in transmission line – Standing waves – Smith chart and its applications.

UNIT – III : TELEVISION FUNDAMENTALS

Television systems and standards – Black and white transmission – Black and white reception – Plumbicon – Vidicon – Scanning and interlaced scanning – Block diagram of TV transmitter and receiver – Colour TV – Generation R, G, B signals – Simplified block diagram of colour TV transmitter and receiver – TV transmitting antennas – dipole panel – TV receiving antenna – Yagi antenna – Log antenna – Log periodic antenna.

UNIT – IV : RADAR SYSTEMS

RADAR – Principle of radar – Radar performance factors – Radar equation – Radar– Pulsed systems – Basic pulsed radar system – Antennas and scanning – Display methods – Pulsed radar systems – Moving target indication – Radar beacons – Transmitting systems – Radar antennas – Duplexer – Radar receivers uses of radar.

UNIT – V : DIGITAL COMMUNICATIONS

Digital communications – Digital technology – Fundamentals of data communication systems – Binary number system – Digital electronics – Emergence of data communication systems – Characteristics of data transmission circuits – Digital codes – Error detection and correction – Data sets and inter connection – Requirements – Modern classification – Modern interfacing.

TEXT BOOKS

1. Gupta and Kumar, *Hand book of Electronics*, Pragati Prakhasan, 2005.
2. Kennedy and Davis, *Electronics Communication Systems*, Kennedy and Davis, TMH, 2009.

REFERENCES

1. Wayne Tomasi, *Electronic communication systems*, Dorling Kindersely India Pvt Ltd., 2009.

2. Roy Blake, Electronic communication system, Delmar/Thomson Learning, 2002.
3. Bakshi U.A. and Godse A.P.,*Basic Electronics Engineering*, Technical Publication, 2009.
4. Godse A.P.and Bakshi U.A., *Basic Electronics*,Technical Publication,2009.

Course Nature : Theory							
Assessment Method (Max.Marks: 100)							
In Semester	**Assessment Tool**	**Cycle Test I**	**Cycle Test II**	**Model Examination**	**Assignment**	**Attendance**	**Total**
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End Semester Weightage							**50%**
Total							**100%**