

**NATIONAL COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI - 1**  
**B.Sc. (PHYSICS) –SCHEME AND SYLLABUS - CBCS SYSTEM**

(Applicable to the candidates admitted from the academic year 2013-2014 onwards)

Semester	Part	Course Title	Title	Instr. Hours/ week	Credit	Exam Hours	Marks			Total	
							Int	Ext			
								Oral	W		
I	I	Language Course-I (LC - I)	Language	6	3	3	25		75	100	
	II	English Language Course-I (ELC-I)	English	6	3	3	25		75	100	
	III		Core Course - I (CC-I)	Properties of Matter and Sound	5	5	3	25		75	100
			Core Course - II (CC-II)	Physics Major Practical -I	3	-	-	-		-	-
			First Allied Course-I (1AC-I)	Allied Mathematics I	5	3	3	25		75	100
			First Allied Course - II (1AC-II)	Allied Mathematics II	3	-	-	-		-	-
	IV	Skill Based Elective-I (SBE-I)	Office Automation	2	2	3	25		75	100	
	<b>Total</b>			<b>30</b>	<b>16</b>					<b>500</b>	
II	I	Language Course-II (LC-II)	Language	6	3	3	25		75	100	
	II	English Language Course - II (ELC-II)	English	4	2	3	25		75	100	
		Communicative English -I (CEC-I)	Communicative English -I	2	1	3	25	5	70	100	
		Core Course - II (CC-II)	Physics Major Practical -I	3	5	3	25	5	70	100	
	III		Core Course - III (CC-III)	Mechanics and Relativity	5	5	3	25		75	100
			First Allied Course - II (1AC-II)	Allied Mathematics II	3	3	3	25	5	70	100
			First Allied Course - III (1AC-III)	Allied Mathematics III	5	3	3	25		75	100
	IV	Environmental Studies	Environmental Studies	2	2	3	25		75	100	
	<b>Total</b>			<b>30</b>	<b>24</b>					<b>800</b>	
III	I	Language Course - III (LC-III)	Language	6	3	3	25		75	100	
	II	English Language Course-IV(ELC-IV)	English	4	2	3	25		75	100	
		Communicative English - V (ELC-V)	Communicative English -II	2	1	3	25	5	70	100	
	III		Core Course - IV (CC-IV)	Thermal Physics	5	5	3	25		75	100
			Core Course - V (CC-V)	Major Practicals-II	2	-	-	-		-	-
			Second Allied Course-I (2AC-I)	Allied Chemistry I	5	3	3	25		75	100
			Second Allied Course - II (2AC-II)	Allied Chemistry Practical	2	-	-	-		-	-
	IV		Skill Based Elective Course II - (SBEC-II)	Desktop Publishing	2	2	3	25		75	100
		Skill Based Elective Course III - (SBEC-III)	Office Automation & Desktop publishing Lab	2	2	3	25		75	100	
	<b>Total</b>			<b>30</b>	<b>18</b>					<b>700</b>	

IV	I	Language Course – IV (LC-IV)	Language	6	3	3	25		75	100	
	II	English Language Course–IV(ELC-IV)	English	6	3	3	25		75	100	
	III		Core Course – V (CC-V)	Major Practicals-II	3	5	3	25		75	100
			Core Course – VI (CC-VI)	Basic Electronics	5	5	3	25		75	100
			Second Allied Course – II (2AC-II)	Allied Chemistry Practical	3	3	3	25	5	70	100
			Second Allied Course – III (2AC-III)	Allied Chemistry II	5	3	3	25		75	100
	IV		Non Major Elective Course–I (NMEC-I)		2	2	3	25		75	100
		<b>Total</b>		<b>30</b>	<b>24</b>					<b>800</b>	
V	III		Core Course – VII (CC-VII)	Optics	5	5	3	25		75	100
			Core Course – VIII (CC-VIII)	Electricity, Magnetism and Electromagnetism	5	5	3	25		75	100
			Elective Course – I (EC-I)	Digital Electronics and Microprocessor	5	4	3	25		75	100
			Elective Course–II (EC-II)	Computer Programming – C Language	4	4	3	25		75	100
			Core Course – IX (CC-IX)	Major Practical – III	2	-	-	-		-	-
		Core Course – X (CC-X)	Major Practical – IV	3	-	-	-		-	-	
IV		Non Major Elective Course –II (NMEC-II)		2	2	3	25		75	100	
		Value Education Course – VEC	Value Education	2	2	3	25		75	100	
		Soft Skills		2	2	3	25		75	100	
		<b>Total</b>		<b>30</b>	<b>24</b>					<b>700</b>	
VI	III		Core Course – IX (CC-IX)	Major Practical – III	3	5	3	25		75	100
			Core Course – X (CC-X)	Major Practical – IV	3	5	3	25		75	100
			Core Course – XI (CC-XI)	Atomic and Nuclear Physics	6	6	3	25		75	100
			Core Course – XII (CC-XII)	Elements of Theoretical Physics	6	6	3	25		75	100
			Core Course – XIII (CC-XIII)	Solid State and Materials Science	6	6	3	25		75	100
			Elective Course– III (EC-III)	Opto Electronics and Fiber Optic Communication	5	4	3	25		75	100
			Gender Studies		1	1	3	25		75	100
		<b>Total</b>		<b>30</b>	<b>33</b>					<b>700</b>	
V		Extension Activities		--	1	--	--	--	--	--	
		<b>Total</b>		<b>180</b>	<b>140</b>					<b>4200</b>	

There will be oral test for all practical examinations and Communicative English Course. The oral test will carry 5 marks in the external component.

nraAs; (, ffhy , yffpak) > ci uei l > rWfi j > , yffpa tuyhW > gadKi wj j kp; -  
U13T1

gUtk; : l

ghl k; : l

fwgpfFk; fhyk; : 6

j ugGSSp : 3

**myF - 1:**

ghuj pahu; ftpi j fs; :	] u] ;tj p Nj tpaed; Gfo;
	ghuj ehL
ghuj gj hrd; ftpi j fs; :	j kpaed; , dpi k
	, dgj j kpa>
	c yfk; c d;Di l aJ > nfhl L KuNr
gl LfNfhl j l ahu; ftpi j fs;	ci ogGk; Nj i t
	, td; NrhW NghLfwhd > mtd; \$W NghLfwhd;
ehkfy; ftpiQu; ghl yfs; :	, sej kpaDfF
fz z j hrd; ftpi j fs; :	ghLtJ ehdy

**myF - 2:**

mgJy; uFkhd;	:	kz ;
i tuKj ;J	:	ghuj p epi df;fggLfwhd;
Nkj j h	:	nrUgGl d; xU Ngl b
khh	:	Nt fk > j kpaGGW > Ruz l ykhk?
		rptgGehl h > fhj Nyh fhj y > goffk; nghyyhj J
, dFyhg;	:	xU Gddi fr; rkpi fahy;
mKj ghuj p	:	i ` f;\$
ehl LgGwg; ghl yfs;	:	xgghug; ghl y; - gpaahwg; Nghtj pyi y

**myF - 3: ci uei l:**

ghuj pahu;	-	j pahdqfS k; kej paqfS k;
j pU.tpf.	-	kdj d;
c.Nt.rh	-	vJ j kpa?
uh.gp NrJggps; s	-	FbAk; gi lAk;
K.t.	-	nkhop , yyhj epi y
GJ i kggj j d;	-	j kpa; ehfupfj j py;

**fphkthofj f**

fy;fp	-	Gi d;fspd; Nti y eWj j k;
rpv d; mz z hJ i u	-	gwW
R[ hj h	-	fI Ts; , Uf;fwhuh?

**myF - 4: rWfi j:**

tpay; fhyk;	-	Ki dtu; , uh.ghyRgukz pad;
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**myF - 5:****, yffp̄a tuyhW**- , Ugj hk; E}wwhz Ł  
(Gj pdk> ehl fk; eb;fyhf)**gadKi wj j kp;**- tykpFk; tj p̄fspd; nj hFgG  
kpfhi kf;Fupa tj p̄fs;  
(eyy j kp; vOj Ntz Łkh  
gf;260 - 290.**ghl E)y;**

1. nraAs&gt; c i uei l

- fy;Y}up ntspaL

2. r̄pWfi j

- t̄p̄bayfhyk&gt;

Ki dtu; , uh. ghyRgukz p̄ad;

3. , yffp̄a tuyhW

- nghJ

4. gadKi wj j kp;

- eyyj kp; vOj Ntz Łkh&gt;

m.f̄p̄ guej hkdhu&gt; gf;260-290

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**nraAs; (, i l f̄fhy , yffp̄ak)> Gj pdk> , yffp̄a tuyhW****nraAs;U13T2****gUtk;: ll****ghl k; : ll****fwgpfFk; fhyk; : 6****j ugGss̄p : 3****myF - 1**

1.1 j p̄UQhdrkgej u; Nj thuk; j p̄UFNfhhbf;fh j p̄Uj j yk; (11 ghl y;fs) , dW..

1.2. j p̄UehTf;furu; Nj thuk; j p̄UgGfY}u; j p̄Uj j yk; (10 ghl y;fs) kUsth..

1.3. Rej u; Nj thuk; j p̄Uthi df;fh j p̄Uj j yk; (10 ghl y;fs); ki wfs;..

1.4. khz p̄f;fthrfu; j p̄Uthrfk; - j p̄Untkghi t (10 ghl y;fs) Mj p̄Ak;..

**myF - 2**

2.1. Mz łhs; j p̄Ugghi t (10 ghRuq;fs) Xqfp̄

2.2. nj hz ł ubgnghbaho;thu; j p̄Ukhi y (10 ghRuq;fs) gri r

2.3. j p̄Ugghz ho;thu;mk ydhj p̄p̄uhd; (10 ghRuq;fs)

2.4. FyNrfuho;thu;ngUkhs; j p̄Unkhop (11 ghRuq;fs) CNdW

**myF - 3**

3.1. - Kj ;J fFkhurhkp̄ ḡp̄si sj j kp; (2 ghl y;fs)

3.2. - eej p̄f;fykgfk; - 5 ghl y;fs;

3.3. - Kf;\$l wgsS - 5 ghl y;fs;

3.4. - xsi tahu; ghl y;fs; - 4 ghl y;fs;

3.5. - fhsNkfgGytu; ghl y;fs; - 3 ghl y;fs;

3.6. - rfj pKj j gGytu; ghl y; - 1 ghl y;

3.7. - fkgu; ghl yfs; - 3 ghl yfs;

### myF - 4

Gj pdk;- rKj ha tjj p - eh. ghuj j rhuj p

### myF - 5

#### 5.1. , yffpə tuyhW

5.1.1. - gfj p , yffpək; [i rtk> i tz tk]

5.1.2. - rppwyffpək; [gpsi sj j kp> fykgfk>gsS

5.1.3 -Gj pd , yffpək;

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### fhggpək> ehl fk> , yffpə tuyhW-U13T3

gUtk; : III

ghl k; : III

fwgpfFk; fhyk; : 6

j ugGssp : 3

### myF - 1

1. rpyggj pfhuk; (, sqNfhtbfs) - tofFi u fhi j

2. kz pNkfi y (rjj i yrrhj j dhu)- Mj pi u gpi rapl l fhi j

### myF - 2

3. fkguhkhaz k; (fkgu) - , uhkhtj huk; - fhl rpggl yk;

4. ngupəGuhz k; (Nrf;fpohu)- Gryhu; ehadhu; Guhz k;

### myF - 3

5. , NaRfhtpək; (fz z j hrd) - ki ygnghoṽT

6. rlvhgGuhz k; (c kWgGytu) - khDfFG; gpi z epdw gl yk;

### myF - 4 :

7. j z z B; j z z B; (Nfhky; Rthkpeh d)- ehl fk;

### myF - 5

8. , yffpə tuyhW - fhggpək> Guhz k> ehl fk;

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### gz i l , yffpək> , yffpə tuyhW> nkhoggapwrp -U13T4

gUtk; : IV

ghl k; : IV

fwgpfFk; fhyk; : 6

j ugGssp : 3

### myF - 1

1. FWenj hi f - 10 ghl yfs; (8>18>25>40>58>99>131>135>167>196)

2. ewwpi z - 5 ghl yfs; (1> 3> 16> 30> 355)

3. l qFEJW - 10 ghl yfs; (nryT mOqFtj j ggj J)

**myF - 2**

4. f yj nj hi f - 2 ghl y;fs; (Fw;Qr;f;fy;15> Kyi yf;fy;11)  
 5. mfehD}W - 2 ghl y;fs; (129> 140)  
 6. GwehD}W - 10 ghl y;fs; (95>165>182>183>184>188>194>195>204)

**myF - 3**

7. j ;Jf;Fws; - mwj ;Jgghy; 5 mj ;fhuq;fs; (11> 13> 14> 43> 47)

**myF - 4**

8. gj ;Jgghl L - Kyi ygghl L KOtJk; (egGj dhu)

**myF - 5**

, yf;f;pa tuyhW-vl Lj nj hi f> gj ;Jgghl L> gj ;ndz ; fb;f;fz f;F> nkhoggawrp -  
 nghJ f;f;I Li u (nghJ mw;T> ehl ;LeI gG> rKj ha Nehf;F gww;pad)

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**ENGLISH FOR COMMUNICATION – U13E1**

**Semester: I**

**English Language Course: I**

**Instruction Hours/Week: 6**

**Credit: 3**

**Unit I :**

1. Civilization and History – C.E.M. Joad
2. The Fun They Had – Issac Asimov

**Unit II :**

3. Big Numbers and Infinities – George Gamow
4. Oil – G.C. Thornley

**Unit III:**

5. An Observation and An Explanation – Desmond Morris
6. A Robot about the House – M.W. Thring

**Unit IV:**

7. A Wrong Man in Worker's Paradise – Rabindranath Tagore
8. Making Surgery Safe – Horace Shipp

**Unit V:**

9. Using Land Wisely – L. Dudley Stam
10. The Karuburator – Karel Capek

**Text Book:** English through Reading, by W.W.S. Baskar and N.S. Prabu, Published by Macmillan Publishers India Ltd.,

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**ENGLISH THROUGH EXTENSIVE READING - U13E2**

**Semester : II**

**English Language Course : II**

**Instruction Hours/Week: 4**

**Credit: 2**

**Unit I**

- |              |                                   |
|--------------|-----------------------------------|
| R.K. Narayan | An Astrologer's Day               |
| Boman Desai  | Between the Mosque and the Temple |

**Unit II**

- |          |                      |
|----------|----------------------|
| O. Henry | The Gift Of the Magi |
|----------|----------------------|

	Premchand	The Child
<b>Unit III</b>	R.P. Sisodia	The Last Salvation
	Kasturi Sreenivasan	I Prepare to gotoCoimbatore
<b>Unit IV</b>	F.E.B. Gray	A Slip of the Tongue
	Ruskin Bond	The Eyes are not Here
<b>Unit V</b>	Rabindranath Tagore	The Cabuliwallah
	Guy de Maupassant	The Diamond Necklace

**Text book**

Glimpses of Life ; An Anthology of Short Stories ; Board of Editors [Orient Longman]

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**COMMUNICATIVE ENGLISH I – U13CE1**

**Semester : II** **Communicative English Course: I**  
**Instruction Hours/Week:2** **Credit: 1**

**OBJECTIVES**

01. To Facilitate communication
02. To expose the students to various levels/types of communication.
03. To help the students achieve communicative competency

**UNIT I**

01. At the College
02. on the Campus
03. Outside the class

**UNIT II**

04. At the Post office
05. For Business and Pleasure
06. Review

**UNIT III**

07. Are you Smart?
08. Are you creative?
09. Is it too hard to improve?
10. How to win?

**UNIT IV**

11. View points
12. Snakes and ladders
13. Your Self

**UNIT V Write**

14. Circulars, notes-reminders, warnings, farewells, apology;
15. Draft invitations – marriage, annual day, inaugural functions of associations, valediction, seminar, workshop.
16. Draft Short messages- compliments, birthday wishes, notifications, etc.,  
Draft Posters- Slogans, announcements etc.,
17. Dialogue writing

Text Book: Creative English for Communication (2<sup>nd</sup> edition) by Krishnasamy and Sriraman.

Reference: Websites            www.english club.com  
    [www.usingenglish.com](http://www.usingenglish.com)  
    Owl-online writing lab  
    MIT-open course ware  
    www.eslcaf .com

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**ENGLISH FOR COMPETITIVE EXAMINATIONS – U13E3**

**Semester : III**

**English Language Course: III**

**Instruction Hours/Week:4**

**Credit: 2**

**Unit-I:**

Basics of English

- (a) Parts of speech
- (b) Tenses
- (c) Active and passive voice
- (d) Tag questions

**Unit –II:**

- (a) Errors and how to avoid them
- (b) Spotting errors
- (c) Reconstructing passages
- (d) Précis writing

**Unit –III**

Reading comprehension

**Unit –IV:**

Vocabulary – synonyms, antonyms, prefix & suffix, Homonyms, sentence completion, spelling Phrasal verbs & Idiomatic Expressions.

**Unit –V:**

Writing letters and drafting a resume /cv  
 Types of essays and how to write them

Guidance to a group discussion and  
Guidance to attending an interview

**Text book :**

**English for Competitive Examinations** by R.P.Bhatnagar & Rajul Bhargava macmillan India  
ltd. Delhi.

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**COMMUNICATIVE ENGLISH II – U13CE2**

**Semester : III**

**Communicative English Course : II**

**Instruction Hours/Week:2**

**Credit: 1**

**Unit-I:**

Enriching Vocabulary – Register Development; who is who; Synonyms, antonyms, Active and Passive vocabulary, proverbs

**Unit –II:**

Tense Forms with emphasis on differences between Present and Present Continuous; Past and Present Perfect – Framing questions, Auxiliaries, if clauses; conjunctions, and linkers; Prepositions

**Unit –III**

Pronunciation, Good Pronunciation habits, R.P., Greetings, Farewells commands etc.,

**Unit –IV:**

Conversational Skills – Affirmative or Negative Language – idiomatic expressions, Phrases, Dialogue Writing,

**Unit –V:**

Writing Skills – Note- taking, note- making, e-mail- Describing an object- narrating a story

**Reference Books**

- i) A Practical English Grammar by A.J Thomson and A.V. Martinet.
- ii) Remedial English Grammar, by F.T. Wood.
- iii) English for competitive Examinations by R.P Bhatnagar & Rajul Bhargava.

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**READING POETRY AND DRAMA– U13E4**

**Semester : IV**

**English Language Course: IV**

**Instruction Hours/Week:6**

**Credit: 3**

**POETRY:**

<b>Unit: I</b>	John Milton	:	On His Blindness
	Oliver Goldsmith	:	The village Schoolmaster
	William Wordsworth	:	The Solitary Reaper

<b>UNIT II</b>	P.B.Shelley: Ozymandias	
	John Keats	: La Belle Dame Sans Merci
	Browning	: Incident of the French Camp
<b>UNIT III</b>	John Masfield	: Laugh and Be Merry
	Robert Frost	: Stopping By the Woods On a Snow Evening
	John Drink water	: The Vagabond
<b><u>DRAMA:</u></b>		
<b>Unit: IV</b>	Anton Chekhov	: The Bear
	Norman Mckinnel	: The Bishop's Candlesticks
<b>Unit: V</b>	Fritz Karinthy	: Refund
	F.M. Synge	: Riders to the Sea.

**Textbooks:**

- 1) **An Introduction to Poetry** edited by A.G.Xavier; [Macmillan]
- 2) **Nine Modern Plays:** ed. B.T Reddy, Oxford University Press

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### CORE COURSE – I PROPERTIES OF MATTER AND SOUND - U13PH1

**Semester – I**

**Instruction hours/week: 5**

**Core Course : I**

**Credit : 5**

**Objectives:**

- To study the basics of Elasticity and its importance.*
- To study concepts of bending of beams and its applications.*
- To study the concepts of viscosity and surface tension.*
- To study and understand some acoustical phenomena.*

**UNIT I: ELASTICITY**

Introduction-Stress and Strain-Hooke's Law- Different moduli of Elasticity-Poisson's ratio-Work done in a Strain-Relation between elastic moduli-Torsion of a body-Expression for Torque per unit Twist-Work done in Twisting a Wire-Torsional Oscillations-Determination of Rigidity Modulus by Torsional Pendulum (Dynamic Torsion Method).

**UNIT II: BENDING OF BEAMS**

Definition- Beam- Bending Couple- Plane of Bending- Neutral axis-Expression for Bending Moment- Cantilever- Depression for loaded end of a Cantilever-Experiment to find the Young's modulus by cantilever depression method-Oscillations of a cantilever- Measurement of Young's modulus- Non-Uniform bending(Pin and microscope method)- Uniform bending(mirror and telescope method).

**UNIT III: VISCOSITY**

Definition and dimension for coefficient of viscosity-Streamline flow and turbulent flow-Expression for critical velocity-Significance of Reynolds's number-Poiseuille's formula-Correction to Poiseuille's formula- Viscosity of gases- Meyer's formula-Rankine's method for determination of coefficient of viscosity of a gas.

**UNIT IV: SURFACE TENSION**

Definition and dimension for surface tension-Molecular forces-Excess pressure inside a curved liquid surface-Experimental determination of Surface Tension by Jaegar's method-Variation of Surface tension with temperature and its experimental study-Drop weight for determining the surface tension of a liquid- Experiment to determine interfacial tension between water and Liquid.

**UNIT V: SOUND**

Acoustics- Introduction-Reverbration-Reverbration time-Sabine formula for Reverbration time-Absorption coefficient and its measurement-Factors affecting the architectural acoustics and their remedy-sound distribution in an Auditorium-Requisites for good acoustics-Ultrasonics-production of ultrasonics (Piezoelectric Oscillator method)-Detection of ultrasonic waves- Applications of ultrasonics.

**BOOKS FOR STUDY:**

- 1) R.Murugesan, Properties of Matter, S.Cahnd & Co, New Delhi(2008) (Unit I to Unit IV)
- 2) Brijlal, N.Subrahmanyam, Text book of Sound, Vikas Publishing Co, New Delhi-1983 (Unit V only)

Unit	Book	Sections
I	1	1.1, 1.2, 1.5, 1.7, 1.9, 1.13.
II	1	1.14, 1.15, 1.16, 1.17, 1.18, 1.21.
III	1	2.1, 2.2, 2.3, 2.4, 2.13, 2.14
IV	1	3.1, 3.2, 3.9, 3.11, 3.12, 3.17, 3.18.
V	2	10.14 to 10.17, 10.19 to 10.24.3, 10.25, 10.27.

**BOOKS FOR REFERENCE:**

- 1) Brijlal and N.Subrahmanyam, Properties of Matter, S.Chand and Co. Ltd. New Delhi (1999).
- 2) Subramania Iyer, Jeyaraman and Rangarajan, Properties of Matter – S.Chand Publications Newyork-1978.

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**Core Course: II - U13PH2P  
Physics Major Practical –I**

**Semester: I & II**

**Instruction Hours/Week: 3&3**

**Core Course : II**

**Credit : 6**

**(At the End of the SECOND Semester - Any Fifteen Expts.)**

1. Non-uniform bending – Pin and Microscope method.
2. Uniform bending – Optic lever method.
3. Sonometer – Verification of laws of transverse vibrations.

4. Specific heat capacity of a liquid – Newton’s law of cooling method.
5. Meter Bridge – Specific Resistance of a material of a wire.
6. Compound pendulum – Determination of Acceleration due to Gravity (g) and Radius of Gyration (k).
7. Sonometer- Determination of A.C Frequency.
8. Potentiometer-Internal Resistance of a cell.
9. Thermal conductivity of a bad conductor – Lee’s disc.
10. Long Focus Convex lens – Determination of Focal Length (f).
11. Long Focus Concave lens – Determination of Focal Length (f).
12. Newton’s Rings-Determination of Radius of Curvature of a Convex Lens(R).
13. Spectrometer – Determination of Refractive Index ( $\mu$ ) of solid prism.
14. Air wedge – Thickness of insulation of a wire.
15. P.O.Box – Determination of Temperature coefficient of a wire.
16. Surface Tension and Interfacial Tension-by Drop Weight method.

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### Core Course - III MECHANICS AND RELATIVITY - U13PH3

**Semester - II**

**Instruction hours/week: 5**

**Core Course : III**

**Credit : 5**

**Objectives:**

*To study concepts of Projectile, Impulse, Impact and Friction.*

*To understand the dynamics of rigid bodies.*

*To have ideas regarding Gravitation and Centre of Gravity.*

*To study and understand centre of pressure and Bernoulli's theorem*

*To learn the basic concepts of relativity.*

#### **UNIT I: PROJECTILE, IMPULSE, IMPACT AND FRICTION**

Projectile – Range on an inclined plane – Impulse – Impact – Impulsive force–Collision–Coefficient of restitution- Direct impact of a smooth sphere on a smooth horizontal plane-Loss in kinetic energy due to direct impact- Oblique impact of two smooth spheres.

Friction- Laws of Friction-Angle of Friction.

#### **UNIT II: DYNAMICS OF RIGID BODIES**

Moment of Inertia-K.E of a Rigid body-Angular Momentum of a rotating body-Compound Pendulum- Centre of suspension and Centre of oscillation- Centre of percussion-Kater’s pendulum-Bessel’s Modification-Torsion pendulum-Parallel and Perpendicular axis theorem-Calculation of M.I for -Rectangular lamina about an axis perpendicular to its plane -Uniform circular disc - Sphere about a diameter.

**UNIT III: GRAVITATION AND CENTRE OF GRAVITY**

Gravitation potential and Gravitational field due to Spherical shell- Boy's method of Determination of G-Centre of gravity-C.G of a right circular cone- C.G of a solid hemisphere- C.G of a hollow hemisphere- C.G of a solid tetrahedron.

**UNIT IV: HYDROSTATICS AND HYDRODYNAMICS**

**Centre of Pressure:** Definition – CP general case- CP of a rectangular lamina vertically in a liquid with one edge in the surface of the liquid- CP of triangular lamina immersed in a liquid with its vertex in the surface and base horizontal- Laws of floatation-Experimental determination of the metacentric height of a ship.

**Hydrodynamics:**Equation of continuity of flow- Energy of the liquid-Euler's equation for unidirectional flow -Bernoulli's theorem -Torricelli's theorem-Venturimeter-Pitot tube.

**UNIT V: RELATIVITY**

Introduction-Frame of reference- Galilean transformation equation – Michelson Morley experiment and its importance –Postulates of special theory of relativity- Lorentz transformation equations-Length contraction, time dilation-Variation of mass with velocity-Einstein's relation.

**BOOKS FOR STUDY**

1. R.Murugesan, Mechanics and Mathematical methods, S.Chand and Delhi(2008) Units I, III, IV, V
- 2) M.Narayanamurti, Dynamics,The National Publishing Company,(1994 &1996) (Unit- II)
- 3) M.Narayanamurti, N.Nagaratnam ,Statics,Hydrostatics and Hydrodynamics- National Publisher (Friction topics only on Unit I)

Unit	Book	Sections
I	1	2.1, 1.1, 1.2, 2.4
I	2	5.6, 5.5
II	2	9.2 to 9.4, 9.20 to 9.25, 9.21
III	1	3.1, 3.2 to 3.6
IV	1	4.3 to 4.7, 5.3, 5.4
V	1	17.1, 17.2, 17.4, 17.6 to 17.10, 17.12, 17.4.

**BOOKS FOR REFERENCE**

1. D.S.Mathur, Mechanics –S Chand and Co., Delhi (2007).
2. Gupta, Kumar and Sharma, Classical Mechanics, Pragati Prakashan Publication, Meerut-1996.

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### Core Course - IV THERMAL PHYSICS - U13PH4

Semester- III  
Instruction hrs. /week : 5

Core Course : IV  
Credit : 5

**Objectives:**

*To study the fundamental Laws of Thermodynamics and concept of Entropy.  
To brief out the ideas of Low temperature physics, Radiation Laws.  
To outline the concept of Specific Heat and Superconductivity.*

**UNIT I: THERMODYNAMICS**

Zeroth law of thermodynamics – Concept of heat- Internal energy - First law of thermodynamics – Reversible and irreversible process–Carnot’s Reversible engine - Carnot’s Engine and Refrigerator – Mean free path – Viscosity of gases – Thermal conductivity of gases – Transport of thermal energy – Self Diffusion.

**UNIT II: ENTROPY**

Second law of thermodynamics - Concept of entropy –Change of entropy in reversible and irreversible processes – Temperature – Entropy diagram (T.S.) – Entropy of a perfect gas - Principle of increase of entropy – Third law of thermodynamics - Zero point energy-Negative temperature –Maxwell’s Thermo dynamical relations.

**UNIT III: LOW TEMPERATURE**

Joule – Thomson’s effect - Porous plug experiment–Theory of porous plug- Liquefaction of gases – Liquefaction of Helium-Helium I and II-Adiabatic demagnetization –Refrigeration cycle- Electrolux refrigerator –Air conditioning system-Equipments used-Classification-Summer- Air conditioning system.

**UNIT IV: RADIATION**

Stefan’s law and its Derivation- Derivation of Newton’s law from Stefan’s law-Stefan’s constant by laboratory method- Black body Radiation – Distribution of energy in black body spectrum – Planck’s law –Rayleigh Jean’s law – Pyrometry – Angstrom’s pyroheliometer - Solar constant Temperature of the sun – Some everyday applications of solar energy

**UNIT V: SPECIFIC HEAT AND SUPER CONDUCTIVITY**

Specific heat of solids – Dulong and Petit’s law – Einstein’s theory of Specific heat – Debye’s theory of specific heat -Calorific value of fuels-Bomb calorimeter-Bell calorimeter–Super conductivity – Meissner’s effect – Type I & II super conductors.

**BOOK FOR STUDY**

1. Brijlal, N.Subrahmanyam and P.S.Hemne, Heat, Thermodynamics and Statistical Physics, S.Chand & Co, New Delhi, (2007)

Unit	Sections
I	4.2,4.3,4.6,4.7,4.20 to 4.24,4.26,3.2,3.5,3.8 to 3.12,3.16.
II	4.28, 5.1, 5.2, 5.4 to 5.9, 5.15, 5.16, 5.17, 6.3.
III	2.20, 2.21, 2.23, 7.6, 7.11 to 7.13, 7.16, 7.21, 17.2 to 17.6.
IV	8.20, 8.21, 8.23, 8.13-8.15, 8.17, 8.25- 8.28, 8.35.
V	14.15 to 14.20, 7.19, 7.20.

**BOOKS FOR REFERENCE**

1. J.B Rajam & C.L. Arora, Heat and Thermodynamics S Chand & Co, New Delhi (2004).
2. Sharma JK, Sarkar KK, Thermodynamics and Statistical Physics, Himalaya Publishing House (1991).
3. Roy,S.K,Thermal Physics and Statistical Mechanics, Wiley Eastern Publishers, New Delhi Ltd.(2000).

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**Core Course – V MAJOR PRACTICALS-II - U13PH5P****SEMESTER: III & IV****Instruction hrs. /week: 2+3 hrs****Core Course : V****Credit : 5****(At the End of the FOURTH Semester-Any Twelve expts.)**

1. Static Torsion – Determination of Rigidity Modulus (n).
2. Torsional pendulum- Determination of Rigidity Modulus(n) and Moment of Inertia (I).
3. Coefficient of viscosity of highly viscous liquid
4. Stoke's method – Viscosity of highly viscous liquid
5. Characteristics of junction diode.
6. Emissive power of a surface – Spherical calorimeter
7. Joule's calorimeter – Specific heat capacity of liquid (Barton's correction)
8. Carey Foster's Bridge-determination of resistance(R) and Specific Resistance ( ).
9. Potentiometer – Ammeter calibration.
10. Potentiometer – Temperature coefficient ( ).
11. Potentiometer – Calibration of low range voltmeter
12. Figure of merit – Mirror Galvanometer
13. Transistor Characteristics – CE – configuration
14. Spectrometer – Refractive Index ( $\mu$ ) of a liquid

15. Spectrometer – I-d curve
16. CRO – Study of wave forms – Lissajous figures – Frequency determination
17. Construction of Full wave rectifier
18. Zener Diode Characteristics.

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### Core Course - VI BASIC ELECTRONICS - U13PH6

**Semester- IV**

**Instruction hrs. /week : 5hrs**

**Core Course : VI**

**Credit : 5**

**Objectives:**

*To bring out the ideas of Semiconductors and diodes*

*To highlight the ideas of Transistors, Oscillators and Amplifiers.*

*To Study the ideas of Operational Amplifiers.*

#### **UNIT I: SEMICONDUCTORS AND DIODES**

Intrinsic and extrinsic semiconductor-V-I characteristics of P-N junction diode-Resistance of a crystal diode-Zener diode characteristics-Zener diode as a voltage stabiliser- Effect of temperature and break down mechanism.

#### **UNIT II: TRANSISTORS**

Transistor terminals-Transistor action-Transistor as amplifier-characteristic curves of transistor-CB, CE and CC mode-Comparison of transistor connections-Load line-operating point-Feedback resistor-Voltage divider method of transistor biasing.

#### **UNIT III: AMPLIFIERS AND OSCILLATORS**

Single stage CE amplifier-RC coupled transistor amplifier-Power amplifier-Classification of power amplifier-Negative voltage feedback amplifier-Essentials of transistor oscillator-Barkhausen criterion-types of transistor oscillators-Tuned collector-Hartley and Wein bridge oscillator.

#### **UNIT IV: SPECIAL SEMICONDUCTOR DEVICES**

JFET-working & characteristics - difference between JFET and Bipolar Transistor-JFET parameters-working & V-I characteristics of SCR, UJT, UJT as Relaxation Oscillator.

#### **UNIT V: OPERATIONAL AMPLIFIERS**

Symbol of Op-Amp-parameters of Op-Amp-CMRR-Slew rate-Inverting amplifier-Non Inverting amplifier-Applications: Inverting adder and Non-inverting adder-Subtractor-Integrator-Differentiator.

**BOOK FOR STUDY:**

1. V.K.Metha, Rohit Metha, Principles of Electronics, S.Chand and company Ltd (2011 Multi Colour Edition).

Unit	Sections
I	5.8, 5.9, 5.18, 6.3, 6.8, 6.10, 6.13, 6.15, 6.25, 6.27
II	8.1,8.2,8.4,8.6,8.8 to 8.10,8.12 to 8.14,8.17,8.18,9.11,9.12.
III	10.1, 10.3, 11.5, 12.5, 12.6, 13.1, 13.2, 14.6 to14.11, 14.14
IV	19.2 to19.4,19.6,19.8,19.10,20.1,20.2,20.5,21.11,21.13,21.15.
V	25.1,25.8,25.9,25.11,25.12,25.16,25.20,25.24 to 25.26,25.32,25.34,25.35

### BOOKS FOR REFERENCE:

1. B.L.Theraja, Basic Electronics solid state, S.chand and Company Ltd (2005).
2. R.S.Sedha, A textbook of Applied Electronics, S.Chand and company Ltd., (2009).
3. Subramanyam.A, Applied Electronics- -National Publishing company-1999.
4. Garg, Rakesh Kumar-Basic Electronics, NewDelhi-2009.
5. Muthu Subramanian. R-Basic Electronics Engineering-TMH, New Delhi, 2000.

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### Core Course- VII – OPTICS - U13PH7

Semester-V

Core Course : VII

Instruction hrs./week: 5

Credit : 5

### Objectives:

*To introduce the optical concepts like interference, diffraction  
To highlight the various applications of geometric optics and some idea  
about resolving power.*

### UNIT I: ABERRATIONS

Aberration-Spherical Aberration in a Lens-Reducing Spherical Aberration- Curvature of the field - distortion- Dispersion by a prism - Chromatic Aberration - Achromatic lenses and condition for Achromatism when two lenses are in contact – Achromatism of a camera Lens.

### UNIT II: INTERFERENCE

Colour of Thin films-Air wedge-Testing the planeness of the surface-Theory of Newton's rings- Wavelength of monochromatic light using Newton's rings – Haidinger fringes-Michelson Interferometer working -Determination of wavelength and determination of neighboring wavelength using Michelson Interferometer - Interference filter.

### UNIT III: DIFFRACTION

Fresnel's diffraction – Diffraction at a (i) circular aperture (ii) Opaque circular disc (iii) Straight edge. Fraunhofer diffraction at a single slit –double slit-missing orders in a doublet-

Grating with theory –Oblique incidence – Overlapping of spectral lines-Absent Spectra- Determination of wavelength using Grating.

#### **UNIT IV: EYEPIECE AND RESOLVING POWER OF OPTICAL INSTRUMENTS**

Field lens-Ramsden's eyepiece - Huygen's eyepiece and its cardinal points –comparison between Hygen's and Ramsden Eyepiece. Resolving power – Rayleigh's criterion of resolution. Resolving power of a (i) telescope (ii) Prism (iii) Grating – Dispersive power of a grating.

#### **UNIT V: POLARIZATION**

Nicol prism – Nicol prism as an analyzer and polarizer – Huygens's explanation of Double refraction in uniaxial crystals- quarter wave and half wave plate- Production and Detection of Elliptical, Circular and Plane polarized light-Optical activity-Babinet's compensator- Fresnel's explanation of rotation -Specific rotation--Laurent's Half shade polarimeter.

#### **BOOK FOR STUDY**

1. Brijlal , N.Subrahmanyam, Optics, S.Chand & Co, New Delhi(2006).

<b>Unit</b>	<b>Sections</b>
I	8.1, 9.2, 9.5, 9.5.1, 9.10, 9.13, 9.16.
II	15.4, 15.5, 15.5.4, 15.6.1 to 15.6.7, 15.7.1 to 15.7.7, 15.8.1, 15.8.2, 15.17, 23.1, 23.2.1, 23.2.2.
III	17.7 to 17.10, 18.1, 18.2, 18.4, 18.4.2, 18.4.3, 18.7, 18.7.1 to 18.7.6
IV	10.10 to 10.12, 18.7.7, 19.1, 19.2, 19.5 to 19.8, 19.11, 19.12.
V	20.1, 20.6.1, 20.8.3, 20.9, 20.17.1, 20.17.2, 20.18 to 20.21, 20.24.1 to 20.24.3, 20.25, 20.26.

#### **BOOKS FOR REFERENCE**

1. Khanna and Gulati- Optics.
2. Ajoy Chatak, Optics, Tata-McGraw-Hill publications (2004).

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#### **Core Course VIII - U13PH8**

#### **ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM**

**Semester: V**

**Core Course : VIII**

**Instruction hrs. /week :5**

**Credit : 5**

#### **Objectives:**

*To study the fundamental ideas of Electrostatics and Current Electricity.*

*To bring out the basic ideas of Electromagnetic induction, AC Circuits and Magnetism.*

**UNIT I: ELECTROSTATICS**

Coulomb's inverse square law- Gauss theorem and its applications- Electric field due to uniformly charged sphere-Electric field due to uniform cylindrical charge-Electric field due to infinite plane sheet of charge-Coulomb's theorem-Deduction of Coulomb's law of Gauss law-Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charge.

**UNIT II: CURRENT ELECTRICITY**

Kirchoff's Law- Wheatstone condition for bridge balance – Carey Foster's Bridge –Potentiometer principle- Calibration of ammeter and voltmeter-Seebeck effect- Law of thermo emf- Measurement of thermo emf using potentiometer-- Theory of moving coil ballistic galvanometer- Correction for: Damping–Figure of merit.

**UNIT III: MAGNETISM AND MAGNETIC EFFECT**

Basic definitions - Susceptibility –Properties of para, dia and ferro magnetic materials–Experiment to draw B-H curve by ballistic method–Energy loss due to hysteresis-Importance of hysteresis – Maxwell's screw rule-Fleming's left hand rule-Biot-Savart Law-Magnetic induction at a point due to a straight conductor- Magnetic induction at a point on the axis of circular coil-Force on a current carrying conductor in a magnetic field-Force between two parallel current carrying conductors.

**UNIT IV: ELECTROMAGNETIC INDUCTION**

Faraday's Law– Self inductance – Self inductance of a long solenoid –Determination of self inductance by Rayleigh's method- Mutual inductance- Mutual inductance between two co-axial solenoids –Experimental determination of mutual inductance- Coefficient of coupling –Growth decay of current in circuit containing L and R- Charging and discharging of capacitor through R- High resistance by leakage.

**UNIT V: AC CIRCUITS**

EMF induced in a coil-peak value and rms value of an AC – AC circuit containing L, C and R in series– Q factor – Series and Parallel resonance circuits-Comparison – Sharpness of resonance– Power in AC circuit containing L,C,R– Wattless current-choke coil.

**BOOKS FOR STUDY**

1. R.Murugesan, Electricity and Magnetism, S.Chand & Co (2008).

Unit	Sections
I	1.2,2.1,2.2,2.5,2.6,2.8,2.9,2.11,2.14,4.1 to 4.4,4.9,4.11.
II	6.6, 7.1, 7.2, 8.1, 8.2, 8.3, 10.11, 10.13.
III	15.1, 15.2, 15.4 to 15.8, 15.15 to 15.17, 10.2 to 10.4, 10.7, 10.8
IV	11.2 to 11.5, 11.7 to 11.10, 12.1 to 12.4.
V	13.1 to 13.6.

**BOOKS FOR REFERENCE**

1. Narayanamoorthy and Nagaratnam, Electricity and Magnetism National Publishing Comp. Chennai-(2005).
2. Brijlal, N.Subrahmanyam – Electricity and Magnetism,Prakati Prakasam Publications, Meerut(2004).

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**Elective Course -I****DIGITAL ELECTRONICS AND MICROPROCESSOR - U13PH9E****Semester-V****Elective Course: I****Instruction hrs. /week-5****Credit : 4****Objective:**

*To learn the basic Ideas of Combination and Sequential circuits.*

*To introduce the fundamental ideas about the Number System, Boolean Expressions and K map.*

*To study the Architecture of Microprocessor 8085 and to write simple programs using it.*

**UNIT I: NUMBER SYSTEMS AND LOGIC GATES**

Introduction to decimal, binary, octal, hexadecimal number systems – Inter conversions –BCD code, Excess – 3 code, Gray code – One’s and two’s complements – Simple binary arithmetic operations – Addition, subtraction, multiplication and division – Binary subtraction using one’s and two’s complements – Positive and negative logic – Basic and derived logic gates, symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates.

**UNIT II : BOOLEAN ALGEBRA AND SIMPLIFICATION OF LOGIC EXPRESSIONS**

Boolean algebra – Basic laws of Boolean algebra – De-Morgan’s theorems reducing Boolean expressions using Boolean laws – SOP and POS forms of expressions min terms and maxterms – Karnaugh map simplification.

**UNIT III: COMBINATIONAL DIGITAL SYSTEMS**

Half and full Adders-Half and full subtractors-four bit adder-subtraction by 1’s and 2’s compliment using Adder-Multiplexer-Demultiplexer-Decoder-2 to 4 and 3 to 8 Decoder-Encoder-Octal to Binary encoder.

**UNIT IV: SEQUENTIAL DIGITAL SYSTEMS**

Flip flop – RS – clocked RS – T and D flip flops – JK and master slave flip flops – Shift registers – SISO and SIPO shift registers - Ring counter –Johnson’s counter – Four bit asynchronous counter – Mod-2 and mod-4 counter –Synchronous counter.

**UNIT V: MICROPROCESSOR (8085)**

Introduction to microprocessor – Basic components of a microcomputer –Memory – ROM – RAM – Architecture of 8085 – Address bus – Data bus – Control bus– Pin configuration – Registers Arithmetic and logic unit – Flags – Instruction format –Types of instructions – Addressing modes – Assembly language programming –Programmes for addition, 8-bit subtraction.

**BOOKS FOR STUDY**

- 1) V.Vijayendran ,Digital Fundamentals, S.Viswanathan, Printers & Publishers Private Ltd, Chennai, 2004. (Unit I to Unit IV).
- 2) B.Ram, Fundamentals of Microprocessor and Microcomputers,Dhanpat Rai Publications, New Delhi, 2008. (for Unit V only).

Unit	Sections
I	Chapters 1,2,3,4.
II	Chapters 5, 6
III	Chapters 8, 9 (sections 9.1 to 9.4)9.1 to 9.4
IV	Chapters 10, 11(sections 11.1 to 11.5)
V	Chapters 3, 4, 6 (sections 6.3, 6.4, 6.21, 6.22)

**BOOKS FOR REFERENCE**

1. W.H.Gothmann ,Digital Electronics,Prentice Hall of India, Pvt, New Delhi 1996.
2. Anokh Singh, A.K.Chhabra, Fundamentals of Digital Electronics and Micropocessors, S.Chand & Co, New Delhi, 2003
3. A.P. Malvino, D.P.Leach,Digital Principles and Application, IV Edition, Tata McGraw Hill, New Delhi, 1968.
4. V.Vijayendran,Fundamentals of Microprocessor – 8085, S.Viswanathan, Printers & Publishers Private Ltd, Chennai, 2004.

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**Elective Course - II****COMPUTER PROGRAMMING – C LANGUAGE - U13PH10E****Semester-V****Instruction hours/week: 4****Elective Course: II****Credit : 4****Objective:**

*To introduce about some C programming concepts.*

*To write some simple programs and some basic idea about flow-charting and algorithms.*

**UNIT I**

Introduction: Importance of C – Basic structure of C Programs – Programming Style.

Character set, Keywords and Identifiers – Constants – Variables – Primary Data Types – Declarations of Variables – Assigning Values of variables.

Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Comma Operators – Arithmetic expressions – Procedure and Associativity.

**UNIT II**

Input Output Operator: getchar, putchar, formatted output (printf) and formatted input (scanf).

Control Structure: Decision making with if - if Else–switch – go to – The break and Continue statements – while, do- while, for statements.

**UNIT III**

Arrays: One – dimensional and two dimensional arrays, declaring arrays– initializing arrays-multi dimensional arrays.

Functions: Basic functions – Return values and their types – calling a function – category of functions – Recursion.

**UNIT IV**

Structures and Union: Structure definition and initialization – Arrays of Structures – Arrays within structures – Structures and functions – Unions.

Pointers: Declaration and initialization- accessing a variable through its pointer-Pointer expressions- Pointers and arrays – pointer and character strings.

**UNIT V**

Development of algorithm, flowchart and program for the following problem.

1. Average of a set of numbers.
2. Conversion of Fahrenheit to Celsius.
3. Solving quadratic equation.
4. Finding the factorial using recursion.
5. Add and subtract two matrices.
6. Find the largest element in an array.
7. Sorting a set of numbers in ascending order.
8. Arrange the names in alphabetical order.

**BOOK FOR STUDY**

1. E.Balagurusamy, Programming in ANSI C– Tata McGraw Hill Publications (2004) - for units I to IV.
2. For Unit V material by the Department of Physics.

<b>Unit</b>	<b>Sections</b>
I	1.1, 1.2, 1.4, 1.5, 2.1 to 2.9, 3.1 to 3.12.
II	4.1 to 4.5, 5.1 to 5.4, 5.7, 5.9, 6.1 to 6.4.
III	7.1 to 7.5, 9.4 to 9.10, 9.13.
IV	10.2, 10.3, 10.4, 10.6, 10.7, 10.9, 10.10, 11.1 to 11.6, 11.8, 11.9.
V	Programs

### **BOOKS FOR REFERENCE**

1. Schaum's Outline Series Theory and Problems of Programming with C – Byron S.Gottfried, Tata Mc Graw Hill, Internationals-1998.
2. Venugopal K.R & Sudep R.P, Programming with C, Tata Mc Graw Hill, 1998.

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### **Core Course IX - MAJOR PRACTICAL III - U13PH11P**

**Semester: V&VI**

**Instruction hrs /week: 2+3**

**Core Course : IX**

**Credit : 5**

**(At the end of the SIXTH Semester.)**

### **SECTION – A- Analog Experiments**

**Any 12 experiments choosing a minimum of 6 from each section**

1. Koenig's method – Uniform bending – Young's Modulus(Y).
2. Spectrometer i-i' curve.
3. Spectrometer – small angle prism.
4. Spectrometer – Grating – Normal incidence.
5. Spectrometer – Grating minimum deviation and dispersive power.
6. Spectrometer – Cauchy's constants.
7. Spectrometer – Fraunhofer lines.
8. Field along the axis of a coil – determination of Magnetic Moment (m).
9. M and H – Absolute determination using deflection and vibration magnetometer.
10. Potentiometer - High range voltmeter calibration
11. Potentiometer-determination of Temperature coefficient of Resistance ( ).
12. B.G. – Figure of Merit.
13. Anderson's bridge- determination of Self Inductance of the coil (L).
14. De-Sauty's Bridge-comparison of two condensers.

### **SECTION – B Digital Experiments**

1. Series and Parallel resonance circuits (CRO can be used).
2. Regulated power supply using Zener, Percentage of regulation.

3. Hartley oscillator using transistor.
4. Colpitt's oscillator using transistor.
5. FET characteristics.
6. Logic gates – AND, OR and NOT gates using discrete components – Truth table.
7. Study of logic gates using IC's.di
8. Universal gates NAND/NOR and basic gates from Universal gates.
- 9 Half adder and Full adder using logic gates.
10. Half Subtractor and Full Subtractor using logic gates.
11. Verification of Demorgan's theorems and Boolean algebra.
12. Adder and Subtractor using Op – Amp.
13. Integrator using and Differentiator using Op – Amp.
14. Study of Flip Flops.

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#### **Core Course X - MAJOR PRACTICAL – IV- U13PH12P**

<b>Semester: V&amp;VI</b>	<b>Core Course : X</b>
<b>Instruction hrs /week: 3+3</b>	<b>Credit : 5</b>

**(At the end of the sixth Semester.)**

**Any 12 experiments choosing a minimum of 5 from each section**

#### **SECTION – A C Program**

1. Average of a set of numbers.
2. Conversion of Fahrenheit to Celsius.
3. Solving quadratic equation.
4. Finding the factorial using recursion.
5. Add and subtract two matrices.
6. Find the smallest and largest element in an array.
7. Sorting a set of numbers in ascending/ descending order.
8. arrange the names in alphabetical order.
9. Multiplication of 2 3x3 matrices.
10. Fibonacci Series.

#### **Section – B – Microprocessor 8085.**

1. 8-bit addition and 8-bit subtraction.
2. 8-bit multiplication and Division.

3. Conversion from decimal to hexadecimal system.
4. Conversion from hexadecimal to decimal system.
5. 16-bit addition.
6. 1's Compliment and 2's Compliment subtraction.
7. Find the smallest number in a given Array.
8. Find the largest number in a given Array.
9. Find the Square of a given number.
10. Find the sum of series of 8-bit numbers (sum 16-bit).

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### **Core Course XI - ATOMIC AND NUCLEAR PHYSICS - U13PH13**

**Semester: VI**

**Core Course : XI**

**Instruction hrs /week: 6**

**Credit : 6**

***Objectives:***

*To study the fundamental ideas of Cathode rays, Atom Models.*

*To bring out the basic ideas of Spectral Lines, Nucleons, and Models.*

#### **UNIT I CATHODE RAYS AND POSITIVE RAYS**

Cathode rays – properties – e/m of cathode rays – Millikon's oil drop method – Positive rays – Properties – e/m of Positive rays: Thomson's parabola method – Aston's Bain'sbridge - Determination of critical Potential – Franck and Hertz's experiment.

#### **UNIT II VECTOR ATOM MODEL**

Various quantum numbers, L-S and j-j Couplings – Pauli's exclusion principle electronic configuration of elements and periodic classification magnetic dipole moment of electron due to orbital and spin motion – Bohr magneton- Stern and Gerlach experiment.

#### **UNIT III FINE STRUCTURE OF SPECIAL LINES**

Special terms and notations – Selection rules- intensity rule and internal rule – Fine structure of sodium D lines – Hyperfine structure– Zeeman effect - Larmor's theorem Debye's quantum mechanical explanation of the normal Zeeman effect – Anamolous Zeeman –Paschen Back effect-Stark effect.

#### **UNIT IV PROPERTIES OF NUCLEUI AND INSTRUMENTS**

Review of basic properties of nuclei – Mass, radius, binding energy, nuclear moments –Isotopes – Isobars – Radioactivity-Cyclotron – Betatron Geiger Muller counter – Wilson cloud chamber – Q value of nuclear reaction – Discovery of neutron, positron.

**UNIT V NUCLEAR MODELS AND ELEMENTARY PARTICLES**

Liquid Drop Model – application to fission, fission fragments, neutrons in fission process– nuclear energy – thermo nuclear reactions – atom bomb. Shell Model – magic numbers– Basic ideas of a nuclear reactor - Bethe's Theory of fusion– hydrogen bomb. Basic classification of subatomic particles – photons, leptons – meson – baryons.

**BOOK FOR STUDY**

1. Murugheshan. R., Modern Physics, S.Chand & Co. (2006).

Unit	Chapter	Sections
I	5, 6	5.1- 5.4, 6.8, 6.10
II	6	6.12 - 6.20
III	6	6.22- 6.28
IV	27, 30, 29	27.1- 27.4, 30.1 30.5 30.6, 29.3 29.6 29.7 29.8
V	27,35,38	27.5,27.7,27.8,27.10,27.11,35.3,35.5-35.7,35.9,38.1

**BOOK FOR REFERENCE**

1. Arthur Beiser, Concept of Modern Physics: Mc Graw Hill, Ed.VI (1999).
2. Brijlal , N.Subrahmanyam,Nuclear and Particle Physics,S.Chand & Co,New Delhi (2005).

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**Core Course - XII**  
**ELEMENTS OF THEORETICAL PHYSICS - U13PH14**

**Semester: VI**

**Core Course : XII**

**Instruction hrs /week: 6**

**Credit : 6**

**Objectives:**

*To learn about the fundamentals of classical formalism*

*To learn about Hamiltonian operator formalisms*

*To learn about introduction to quantum mechanics*

*Fundamentals of relativity*

**UNIT – I CLASSICAL MECHANICS – LAGRANGIAN FORMALISM**

Cartesian Co-ordinates – Principle of Virtual Work – Virtual Force – Generalized Co-ordinates - Generalized Momentum - Generalized Kinetic – Energy – D'Alembert's Principle (D.A.P) – Lagrangian's Equation of Motion From D.A.P - Application  
Hamilton's Principle of Lagrangian Formalism to A) Atwood's Machine B) Simple Pendulum

**UNIT – II CLASSICAL MECHANICS – HAMILTON'S FORMALISM**

Hamilton As Total Energy Operator – Hamilton's Variational Principle – Deduction of Hamilton's Principle from D.A.P – Deduction of Lagrangian Equation of Motion from Hamilton's Principle

**UNIT – III INTRODUCTION TO WAVE MECHANICS**

De Broglie Concept of Matter Waves – De Broglie Wavelength – Wave Velocity and Group Velocity for the De Broglie Waves – G.P. Thomson's Experiment for verifying De Broglie Relation – Heisenberg's Uncertainty Principle

**UNIT – IV SCHRODINGER'S EQUATION**

Operator Formalism – Total Energy, Momentum, Kinetic and Potential Energy Operators – Eigen Function and its Properties - Derivation of Schrodinger's Equation – Time Dependant and Independent – Particle in a Box

**UNIT – V INTRODUCTION TO RELATIVITY**

Einstein's Mass-Energy Relation – Galilean Transformation Equation - Lorentz Transformation Equation – Einstein's Postulates -- Length Contraction

**BOOKS FOR STUDY**

1. Mechanics and Mathematical Physics – R. Murugesan – S. Chand publications , Ed.2008
2. Modern Physics – R. Murugesan & Kiruthiga Sivaprasath – S. Chand Publications – Multicolor edition – Ed.2008

UNIT	BOOK	CHAPTER/ SECTIONS
I	1	6.1 6.2 6.3 6.6 6.7 6.10
II	1	10.1 -- 10.7
III	2	11.1 11.2 11.3 11.4
IV	2	11.8, 11.10
V	2	1.14, 1.4, 1.8, 1.7, 1.9

**BOOK FOR REFERENCE**

1. Modern Physics – Arthur Beiser – Tata Mc Graw Hill Publications.

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**Core Course XIII - SOLID STATE AND MATERIALS SCIENCE - U13PH15**

**Semester: VI**

**Core Course : XIII**

**Instruction hrs /week: 6**

**Credit : 6**

**Objectives:**

*To study the basic idea of Crystal Structure, Atomic Bonding & Imperfections.*

*To make the students aware of the fact that with Modern Technology new materials are rapidly being developed and it is Possible to change the properties of materials.*

**UNIT 1 – CRYSTAL STRUCTURE**

Crystal periodicity - Unit cell - Symmetry elements - Point group – Bravais lattice in 2D and 3D – Miller indices – Inter planar spacing – Density of atoms in crystal plane – SC, BCC, FCC, hcp, diamond, Zinc blende, CsCl and NaCl structures – X-ray diffraction – Bragg's law – Powder method diffractometer.

**UNIT II – BONDING IN SOLIDS AND CRYSTAL IMPERFECTIONS**

Atomic bonding – Ionic bond – Bond dissociation energy – Cohesive energy – Madlung constant – Covalent bond – Metallic bond – Hydrogen bond – Van der Waals bond –Crystal imperfections: point, line and surface imperfections – Colour centres.

**UNIT III – CONDUCTING AND DIELECTRIC MATERIALS**

Interpretation of Ohm's law – Relaxation types and electrical conductivity – Wiedmann-Franz law – Dielectrics – Definitions - Types of electric polarization – Frequency and temperature - Effects of polarization – Dielectric losses – Local field - Clausius-Mosotti relation - Determination of dielectric constants - Schering bridge – Properties of insulating materials

**UNIT IV – MAGNETIC MATERIALS**

Different types of magnetic materials - Classical theory of dia and para magnetism – Weiss theory of paramagnetism - Molecular field theory of ferro magnetism – Domain theory of ferromagnetism – Hard and soft magnetic materials

**UNIT V – NEW MATERIALS**

Metallic glasses – Fiber reinforced plastics - Fiber reinforced metals – Bio materials – Ceramics – Cermets – High temperatures materials - Nano phase materials - Intermetallic compounds – Shape memory alloys - SMART materials.

**BOOKS FOR STUDY**

1. M.A Wahab, Solid state physics- Narosa publications – 2006
2. M.Arumugam - Material Science – Anuradha publications – 2008

Unit	Book	Sections
I	1	1.2, 1.3, 1.6-1.13, 8.6, 8.16
II	1	2.2-2.5, 2.8-2.11, 5.2, 5.4, 5.12
III	2	5.2, 5.3, 5.8, 6.2-6.8, 6.10
IV	2	7.2-7.6, 7.8, 7.9
V	2	11.2, 11.3, 11.6-11.9, 11.13-11.16

**BOOKS FOR REFERENCE**

1. Kittel - Introduction to Solid State Physics – Willey & Sons – 2010
2. S.O. Pillai – Solid State Physics – New Age International Publications – 2005
3. P.K. Palanisamy – Material science – Scitech Publication – 2005.

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**Elective Course -III****Opto Electronics and Fiber Optic Communication - U13PH16E****SEMESTER - VI****Elective Course -III****Instruction hrs. /week : 5****Credit : 4****Objective:**

*To bring out the basic ideas of interaction of light, opto electronic Devices.  
To introduce the basic principle of Laser and production of Laser*

*To study the Principle of Fiber and fiber communication system  
To study the elementary ideas about the storage devices and Hologram*

### **UNIT I: INTERACTION OF LIGHT WITH MATTER**

Introduction-Optical constants-Basic Principle-Extinction coefficient-Absorption coefficient-Reflectivity and Transmissivity-Light absorption in metals, semiconductor-excitons-Franz Keldyesh effect-Salient features of optical absorption in metals, semiconductor and insulator.

### **UNIT II: OPTO ELECTRONIC MATERIALS AND DEVICES**

Optoelectronic materials-Characteristics-Liquid crystal display-Types of display-Light emitting diode-LED materials-LED displays.

**Photo detectors:** Photo conductor-Photo diode-Photo transistor-Solar cell and its applications.

### **UNIT III: LASERS**

Introduction-Basic principle- Laser Characteristics-Spontaneous emission – stimulated absorption-stimulated emission-Einstein Coefficients – Population inversion –pumping action –Laser applications(any four)

Nd-YAG Laser-Helium – Neon –CO<sub>2</sub> Laser – Semiconductor Laser.

### **UNIT IV: FIBER OPTIC COMMUNICATION**

Introduction-Principle of Optic Fibre-Propagation of optical signal through fibre- Acceptance Angle-Numerical Aperture- Single and Multi mode Fibres-Characteristics of Step Index and Graded Index fibres-Light Source: Laser diode-Light detectors: Avalanche photo diode-Optic Fiber communication Link(block diagram)-advantages of fiber optics communication.

### **UNIT V: OPTICAL DATA STORAGE**

Surface Storage-phase change recording-magneto optical data storage-Hi-tech evolved in system development-Automatic focussing-Automatic track following capacity of CD-advantages of CD – Holographic storage-Construction and reconstruction of a Hologram.

### **BOOKS FOR STUDY**

- 1) S.Jayakumar, Material Science,R.K Publishers,Coimbatore,2002.
- 2) P.Mani, Text Book of Engineering Physics-I, Dhanam publications(2009)-5<sup>th</sup>edition.
- 3) P.K.Palanisamy, Semiconductor Physics and Opto Electronics, Scitech publications, 2004.

<b>Unit</b>	<b>Book</b>
I, II	Relevant sections in Book 1
III	Relevant sections in Book 2
IV, V	Relevant sections in Book 3

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## ALLIED MATHEMATICS

### Algebra, Calculus and Differential Equations – U13AMS1

**Semester : I** **First Allied Course : I**  
**Instruction Hours/Week: 5** **Credit : 3**

#### Unit I

Characteristic roots of a square matrix - Evaluation of Eigen values and Eigen vectors - Verification of Cayley – Hamilton Theorem.

#### Unit II

Leibnitz's theorem (statement only) for the  $n^{\text{th}}$  derivative of a product of functions – Applications - Curvature and radius of curvature in Cartesian Co-ordinates .

#### Unit III

General properties of definite integrals (without proof) and problems using these properties - Reduction formula for  $\int_0^{\pi/2} e^{ax} x^n dx$ ,  $\int_0^{\pi/2} \sin^n x dx$ ,  $\int_0^{\pi/2} \cos^n x dx$ , where  $n$  is a positive integer- Evaluation of

$$\int_0^{\pi/2} e^{ax} x^n dx, \int_0^{\pi/2} \sin^n x dx, \int_0^{\pi/2} \cos^n x dx \text{ where } n \text{ is a positive integer.}$$

#### Unit IV

Equation of First order not of First degree Equation solvable for  $dy/dx$ . Equation solvable for  $y$ - Equation solvable for  $x$ . (Simple problems only)- Clairaut's form (Simple case only).

#### Unit V

Formation of partial Differential equations by elimination of constants and arbitrary function-Definition of general, Particular and complete solution of partial differential equations-singular integral(Geometrical meaning not expected) solution of first order equations in their standard forms.  $F(p_1q)=0$ ,  $F(x_1p_1q)=0$ ,  $F(y_1p_1q)=0$ ,  $F(z_1p_1q)=0$ ,  $F_1(x_1p)=F_2(y_1q)$ ,  $Z=p_x+q_y+f(p_1q)$ .

#### Text Books

1. T.K. Manickavasagam Pillai, T.Natarajan & K.S.Ganapathy, Algebra ( Vol. II), S. Viswanathan Pvt.Ltd, Reprint, 2004 (Unit I).
2. S. Narayanan & T. K. Manickavasagam Pillay, Calculus (Vol. I), S. Viswanathan printers and publishers , Reprint 2003(Unit II ).
3. S. Narayanan & T. K. Manickavasagam Pillay, Calculus (Vol. II), S. Viswanathan printers and publishers, Reprint 2003(Units III ).
4. S,Narayanan&T.K.Manickavasagam Pillay, Calculus (Vol.III ), S.Viswanathan Pvt.Ltd Reprint, 2004 (Units IV&V).

Unit I Chapter 2 §16

Unit II Chapter 3 § 2.1,2.2 & Chapter 10§ 2.1,2.2,2.3,2.4

Unit III Chapter 1 § 4, 11, 13.1, 13.3, 13.4

Unit IV Chapter 1 § 5, 5.1, 5.2, 5.3, 5.4, 6.2

Unit V Chapter 4 §1, 2, 2.1, 2.2, 3, 5, 5.1, 5.2, 5.3, 5.4

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## ALLIED MATHEMATICS

### Vector Calculus & Analytical Geometry of Three Dimensions - U13AMS2

**Semester : I & II**

**First Allied Course: II**

**Instruction Hours/Week: 3 & 3**

**Credit : 3**

#### **Unit I**

Vector Differentiation – Vector differential operator (  $\nabla$  ), Gradient, Directional derivatives unit normal vector to the surface, divergence, solenoidal vector, Curl, irrotational vector, vector identities.

#### **Unit II**

Vector integration – line integral – surface integral – volume integral

#### **Unit III**

Gauss divergence theorem (statement only) verification and application – Green's theorem (statement only) and applications - Stoke's theorem (statement only), verification and application.

#### **Unit IV**

Straight line- equation of a straight line – condition for a straight line to lie on a given plane – condition for coplanarity - shortest distance between two straight lines.

#### **Unit V**

Sphere – Standard equation – Length of the tangent from any point – Equation of a tangent plane – condition for the plane to touch the sphere- Intersection of a plane and a sphere - Intersection of two spheres – Equation of a sphere passing through a given circle.

#### **Text Books**

1. K. Viswanathan and S. Selvaraj, Vector Analysis, Emerald Publishers, Chennai, 1999  
(Units I, II & III).
2. S.Narayanan, R.Hanumantha Rao, T.K.Manickavasagam Pillay and P.Kandasamy, Ancillary

Mathematics, Vol. IV, S.Viswanathan printers and publishers Pvt. Ltd., 1996 (Units IV & V).

Unit I Chapter 2 (except §2.2.5)

Unit II Chapter 3 § 3.2 – 3.7

Unit III Chapter 4 § 4.2 - 4.4

Unit IV Chapter 3 (Pages 70 - 85)

Unit V Chapter 4 (Pages 86 - 99)

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## ALLIED MATHEMATICS

### Trigonometry, Laplace Transforms & Fourier Series - U13AMS3

**Semester : II**

**First Allied Course: III**

**Instruction Hours/Week: 5**

**Credit : 3**

#### **Unit I**

Expansion of  $\cos n$ ,  $\sin n$  and  $\tan n$  ( $n$  is a positive integer) – Related problems – Expansion of  $\cos$ ,  $\sin$  in terms of  $e^{in}$  - Expansion of  $\cos^n$ ,  $\sin^n$  in a series of sines and cosines of multiples of  $\theta$ , given in radians (proof not required) and simple problems.

#### **Unit II**

Euler's formula for  $e^{ix}$ . Definition of hyperbolic functions – relation between the circular and hyperbolic functions – Formula involving hyperbolic functions – Expansion of  $\sinh x$  and  $\cosh x$  in power of  $x$ . Inverse hyperbolic functions  $\sinh^{-1}x$ ,  $\cosh^{-1}x$  and  $\tanh^{-1}x$  in terms of logarithmic functions separation into real and imaginary parts of  $\sin(x + iy)$ ,  $\cos(x + iy)$ ,  $\tan(x + iy)$ ,  $\sinh(x + iy)$ ,  $\cosh(x + iy)$  and  $\tanh(x + iy)$ ,  $\tan^{-1}(x+iy)$

#### **Unit III**

Definition – Laplace transform of functions  $e^{at}$ ,  $\cos at$ ,  $\sin at$  and  $t^n$  where  $n$  is a positive integer. First shifting theorem – Laplace transform of  $e^{-at} f(t)$  is  $F(s + a)$  – Laplace transform of  $e^{-at} \cos bt$ ,  $e^{-at} \sin bt$  and  $e^{-at} f(t)$  – Laplace transform of  $f'(t)$  and  $f''(t)$ .

#### **Unit IV**

Inverse Laplace transform relating to the standard forms – Application to the solution of ordinary differential equations with constant coefficients involving the above transformations.

#### **Unit V :**

Definition of Fourier series – Finding Fourier coefficients for a given periodic function with period  $2\pi$  (odd and even function) – Half range series.

#### **Text Books**

1. S. Narayanan, T. K. Manickavasagam Pillai, Trigonometry, S. Viswanathan Pvt. Ltd., Reprint 2004, (Units I, II).

2. S. Narayanan, T. K. Manickavasagam Pillai , Calculus Volume III, S.Viswanathan Pvt.

Ltd, Reprint 2004, (Units III, IV & V)

Unit I Chapter 3 § 1, 2 (pg. 61-68), 4, 4.1, 5

Unit II Chapter 4 § 1, 2, 2.1, 2.2, 2.3

Unit III Chapter 5 § 1, 2, 4

Unit IV Chapter 5 § 6, 7, 8

Unit V Chapter 6 § 2, 3, 3.1, 3.2, 4

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### ALLIED CHEMISTRY I – U13ACH1

**Semester : III**

**Second Allied Course: 1**

**Instruction Hours/Week: 5**

**Credit: 3**

#### UNIT - I

**Shapes of Molecules:** Application of valence shell electron pair repulsion theory to simple molecules -  $\text{BF}_3$ ,  $\text{CH}_4$  and  $\text{H}_2\text{O}$ . **Molecular Orbital Theory:** Some important basic concepts of MO theory - LCAO, bonding and antibonding orbitals and bond order - application of MO theory to  $\text{H}_2$ ,  $\text{He}_2$ ,  $\text{N}_2$ ,  $\text{O}_2$ ,  $\text{F}_2$ .

#### UNIT - II

**Chemical Thermodynamics:** First law of thermodynamics - state and path functions- need for the second law - Carnot's cycle and thermodynamic scale of temperature, spontaneous and non spontaneous processes- entropy - Gibb's free energy. Entropy change and free energy change to decide spontaneity, elementary idea of third law - statement and explanation.

#### UNIT - III

**Chemotherapy:** Definition of chemotherapy- examples each for (i) Analgesics, (ii) antibacterial, (iii) anti-inflammatory, (iv) antipyretic, (v) antibiotic, (vi) antitubercular, (vii) antiviral, (viii) antitussive, (ix) antiallergic, (x) antidiabetics, (xi) antihypertensive, (xii) anaesthetics (local and general) Structure not necessary. **Organic reactions:** Osazone test, biuret test, condensation reactions for aldehydes and ketones, Esterification reaction, Diazotization followed by coupling and phthalein fusion test.

**UNIT - IV**

**Amino Acids and Proteins:** Amino acids - classification based on structure - essential and non-essential amino acids - proteins - classification based on physical properties and biological functions, structure of proteins- primary, secondary and tertiary (elementary treatment).

**UNIT - V**

**Colloids:** Definition - classification of colloidal solutions - preparation, purification, properties - Non-settling, osmotic pressure, Tyndall effect, electrical charge, electrophoresis, Imbibition.**Chemical kinetics:** Order of reactions and their determinations - activation energy, effect of temperature on reaction rate.

**References:**

01. P.L. Soni Textbook of Inorganic chemistry
02. P.L. Soni Textbook of Organic chemistry
03. P.L. Soni Textbook of Physical chemistry

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**ALLIED CHEMISTRY PRACTICAL – U13ACH2P**

**Semester : III & IV**

**Second Allied Course: II**

**Instruction Hours/Week:2+3**

**Credit: 3**

**I VOLUMETRIC ANALYSIS**

**(for pcs st iii&iv)**

1. Acidimetry and alkalimetry
  - (a) Strong acid vs strong base
  - (b) Weak acid vs strong base
2. Permanganimetry
  - (a) Estimation of ferrous sulphate/Mohr's salt
  - (b) Estimation of oxalic acid
3. Iodometry
  - (a) Estimation of  $K_2Cr_2O_7$

**II ORGANIC ANALYSIS**

Qualitative analysis of the following organic compounds

1. Carboxylic acid
2. Amide
3. Primary aromatic amine
4. Aromatic aldehyde
5. Aromatic ketone
6. Carbohydrate
7. Simple phenol

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**ALLIED CHEMISTRY II – U13ACH3****Semester : IV****Second Allied Course: III****Instruction Hours/Week: 5****Credit: 3****UNIT - I**

**Coordination Chemistry:** Complexes - Classification, IUPAC Nomenclature of mononuclear complexes. Chelation and its industrial importance with particular reference to EDTA. Biological role of haemoglobin and chlorophyll. Applications of complexes in qualitative and quantitative analytical chemistry. **Industrial Chemistry:** Fuel gases - Water gas, producer gas, L.P.G. gas, gobar gas and natural gas. Fertilizers - NPK and mixed fertilizers, micronutrients and their role in plant life and biofertilizers.

**UNIT - II**

**Surface Chemistry:** Adsorption - factors affecting the adsorption of gases by solids - types of adsorption - differences between physisorption and chemisorption - catalysis - homogeneous and heterogeneous catalysis - examples. **Photochemistry:** Laws governing the absorption of light - Lambert's law and Beer's law - laws of photochemistry - Grotthus law, Stark-Einsten's law and - quantum efficiency.

**UNIT - III**

**Fundamental concepts in Organic chemistry:** Bond length - bond energy - polar and nonpolar molecules - resonance effect - rules governing resonance - hydrogen bonding - effect on boiling points - effect on water solubility. **Synthetic polymers:** Definition - Teflon, alkyd and epoxy resins, polyesters - general treatment only.

**UNIT - IV**

**Dyes:** Definition - classification of dyes based on structure and method of application. **Fats and oils:** Definition of fats and oils - distinction between fats and oils - properties - analysis of fats and oils - saponification value, iodine value. **Carbohydrates:** Introduction - Classification - Preparation, properties and structural elucidation of glucose.

**UNIT - V**

**Electrochemistry:** Specific and equivalent conductivities - their determinations- effect of dilution on conductivity - an elementary idea about basic theory - Ostwald's dilution law, Kohlraush law, conductivity measurements and conductometric titrations. **Phase rule:** Definition of phase, component and degree of freedom. Explanation of one - component system (Water).

**References:**

1. P.L. Soni Textbook of Inorganic chemistry
2. P.L. Soni Textbook of Organic chemistry
3. P.L. Soni Textbook of Physical chemistry

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**OFFICE AUTOMATION - U13SBE1****Semester : I****Skill Based Elective Course- I****Instruction Hours/Week: 2****Credit: 2****Unit - I**

MS- Word- Introduction to Computers - Hardware - Software, Operating System: Windows XP -MS-Paint, Notepad, WordPad, Introduction to MS-Word, Creating, Editing and Formatting Document - Working with Drawing objects - Text Manipulation

**Unit-II**

Working with Tables – Columns – Labels - Plotting, editing and Filling drawing objects- Bookmark – Header & Footer - Checking and Correcting a document - Creating Labels –Envelops – Mail Merge – Formatted output and Report generation Printing Documents, Working with Internet.

**Unit-III**

Ms – Excel - Ms – Excel: Introduction – Data Entry – Cell Formatting - Plotting Graphs – Workbook Features – Library Functions

**Unit-IV**

Conditional Functions and Data Sorting – Limit the data on a worksheet - Data Validation – Data consolidation - Chart creation - Checking and Correcting Data - Tracking and Managing Changes- Advanced Features

**Unit-V**

Ms – PowerPoint- Introduction - Creating, Editing and Formatting Presentation – Applying Transition and Animation Effects - Applying Design Templates - Viewing and Setting up a Slide Show - Navigating among Different Views - Ms Outlook: Introduction to Folder List – Address

**Book.References**

1. Jill Murphy, Microsoft Office Word- Comprehensive Course, Labyrinth Publications, 2003.
2. McGraw-Hill/Irwin-Deborah Hinkle, Microsoft Office 2003 PowerPoint: A Professional Approach, Comprehensive w/ Student CD, New Delhi, 2003.
3. Nellai Kannan, C., MS-Office, Nels Publications, Tamil Nadu, 2002.

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**DESKTOP PUBLISHING - U13SBE2****Semester: III****Skill Based Elective Course: II****Instruction Hours/Week: 2****Credit: 2****PHOTOSHOP:****UNIT – I**

**Photoshop Tools :** Move, Type, Marquee, Lasso, Crop, Shapes, Healing, Brush, Patch, Cloning Stamp, Eraser, Gradient, Blur, Smudge, Dodge, Pen, Eye Dropper, Patch selection and Zoom tool.

**Layer:** New layer, Layer set, Duplicate layer, Rasterize and Merge down

**Layer Styles:** Drop shadow, inner shadow, outer glow & inner glow, Bevel and Emboss, Gradient overlay, Stroke. Text formatting

## **UNIT – II**

**File:** Save, File formats, Page set up.

**Edit:** Check spelling, Copy merged, Fill, Transform, Define pattern.

**Image:** Motion blur, Twirl, lens flare, Glowing edges, lighting effects, solarize, water paper, Stained glass, Mosaic Tiles.

**Window:** Character and Paragraph settings.

## **COREL DRAW:**

### **UNIT – III**

#### **Drawing Tools:**

Pick, Shape, Knife, eraser, Smudge, Roughen brush, free transform, Zoom ,hand, Free hand, Bezier, Artistic, Pen, Poly line, Point, Interactive connective, Spiral tool.

**Colour Tool:** Paint Bucket Tool, Eye Dropper, Fill Tools. Fill Options, Stroke Options.

### **UNIT – IV**

**Special Effects:** 3D effects, Add perspective, Blend, Contour, Artistic media, lens, and Power clip.

**Shaping Options:** Weld, trim, Intersect.

**Text Effects:** Format text, bullet, and fit text to path, align and straighten, spell check.

**File Menu:** Save, Save as, Import, Page set Up.

## **PAGE MAKER:**

### **UNIT – V**

#### **Page Maker Tools:**

Pointer, Rotate, Line, Rectangle, Ellipse, Polygon, Hand, Text, Crop, Rectangle frame tools. Text layout, Style and Objects: Alignments, Styles, fill, frame options, Stroke, Group, Lock, unlock, mask, polygon settings character and paragraph settings.

**Text Editing:** Edit story: Undo, Redo, Cut, Copy, Paste, paste Special, Spelling check and Find.

**File:** Page set up, save, Save as.

#### **Reference Book:**

**CorelDraw** :CorelDraw IN Simple Steps – Shalini Gupta Corel DRAW Bible - DEBORAH MILLER

**PhotoShop** :Teach Yourself Adobe Photoshop – Rose Carla Adobe Photoshop Cs Classroom in a Book by Adobe Press

**PageMaker** :Using Microsoft Word - Asmita Bhatt Pagemaker In Easy Steps - Scott Basham Ctoa  
Material By Genesis.

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### **OFFICE AUTOMATION & DESKTOP PUBLISHING LAB - U13SBE3P**

**Semester : III**

**Skill Based Elective Course : III**

**Instruction Hours/Week: 2**

**Credit: 2**

#### **Unit – I (Office Automation)**

- 1) Ms – Word : Text Formatting , Mail Merge,
- 2) Ms – Excel : Implement the Statistical & Mathematical Function  
(Using Min ,Max, Median, Average, Standard Deviation, Correlation, Logical 'if' Condition ) for the given data, Prepare a Chart for a given Data using Pie diagram / Histogram

#### **Unit – II (Photoshop)**

- 3) Design a College Broacher / Birthday Card.
- 4) Cropping, rotating and Overlapping the image.
- 5) Create a single image from Multiple image.
- 6) Creating an image with multilayer's.

#### **Unit – III (Corel Draw)**

- 7) Design a Visiting Card \ Greeting Card using Draw & Text tools.
- 8) Create a logo for a Company \ College .

#### **Unit – IV (Page Maker)**

- 9) Type and format a letter using text tool.
- 10) Prepare a Invitation for College Day \ Sports Day.

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### **ENVIRONMENTAL STUDIES - U13ES**

**Semester : II**

**Environnemental Studies Course**

**Instruction Hours/Week: 2**

**Credit: 2**

#### **Unit 1 :**

##### **Environment and Natural Resources :**

- Definition, scope, importance of Environmental Studies - Need for public awareness.  
Natural resources — classification - Associated problems
- a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
  - b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

## **Unit 2: Ecosystems**

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem:
  - a. Forest ecosystem
  - b. Grassland ecosystem
  - c. Desert ecosystem
  - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

## **Unit 3: Biodiversity and its conservation**

- Introduction — Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity: consumptive use,productive use,social,ethical,aesthetic and option values
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation
- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity In-situ and Ex-situ conservation of biodiversity.

## **Unit 4: Environmental Pollution**

Definition

- Cause, effects and control measures of
  - a. Air pollution
  - b. Water pollution
  - c. Soil pollution
  - d. Marine pollution
  - e. Noise pollution
  - f. Thermal pollution
  - g. Nuclear hazards
- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management floods, earthquake, cyclone and landslides.

### **Unit 5 : Social Issues and the Environment**

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

### **REFERENCE**

- a) Agarwal, K.C. 2001 Environmental Biology, Nidi Pubi. Ltd. Bikaner.
- b) Sharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad — 380 013, India, Email:mapin@icenet.net (R)
- c) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p

- d) Clark R.S., Marine Pollution, Clarendon Press Oxford (TB)
- e) Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- f) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- g) Down to Earth, Centre for Science and Environment (R)
- h) Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- i) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
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- k) Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- l) McKinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.
- m) Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- n) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- o) Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- p) Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Pubi. Co. Pvt. Ltd. 345p. q) Sharma B.K., 2001. Environmental Chemistry. Geol Pubi. House, Meerut
- r) Survey of the Environment, The Hindu (M)
- s) Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB) t) Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- u) Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB) v) Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (M) Magazine
- (R) Reference (TB) Textbook

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### VALUE EDUCATION - U13VE

Semester :V

Value Education Course

Instruction Hours/Week: 2

Credit: 2

#### UNIT 1: PHILOSOPHY OF LIFE

Human Life on Earth ( Kural 629), Purpose of Life ( Kural 46) Meaning and Philosophy of Life( Kural 131, 226) The Law of Nature (Kural 374) Glorifying All form of Life in this Universe (Kural 322, 327) – Protecting Nature /Universe (Kural 16, 20, 1038)

**UNIT 2: INDIVIDUAL QUALITIES**

Basic Culture (Kural 72, 431) Thought Analysis (Kural 282, 467, 666) Regulating desire (Kural 367), Guarding against anger (Kural 158, 305, 306, 314), To get rid of Anxiety (Kural 629), The Rewards of Blessing (Kural 3), Benevolence of Friendship (Kural 786), Love and Charity (Kural 76), Self – tranquility/Peace (Kural 318)

**UNIT 3: SOCIAL VALUES (INDIVIDUAL AND SOCIAL WELFARE)**

Family (Kural 45), Peace in Family (Kural 1025), Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) , The Pride of Womanhood (Kural 56) Five responsibilities/duties of Man : a) to himself, b) to his family, c) to his environment, d) to his society, e) to the Universe in his lives (Kural 43, 981), Thriftness (Thrift)/Economics (Kural 754), Health (Kural 298), Education (Kural 400), Governance (Kural 691), People’s responsibility/ duties of the community (Kural 37), World peace (Kural 572)

**UNIT 4: MIND CULTURE**

Mind Culture (Kural 457) Life and Mind - Bio - magnetism, Universal Magnetism (God – Realization and Self Realization) - Genetic Centre – Thought Action – Short term Memory – Expansiveness – Thought – Waves, Channelising the Mind, Stages - Meditation (Kural 261, 266, 270), Spiritual Value (Kural 423)

**UNIT 5: TENDING PERSONAL HEALTH**

Structure of the body, the three forces of the body, life body relation, natural causes and unnatural causes for diseases (Kural 941), Methods in Curing diseases (Kural 948, 949)  
The Five units, simple physical exercises.

**Books for Reference:**

1. Philosophy of Universal Magnetism (Bio-magnetism, Universal Magnetism) The World Community Service Centre Vethatri Publications (for Unit IV)
2. Pope, G.U., Dr. Rev., Thirukkural with English Translation, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613004 (for All Units)
3. Value Education for Health, Happiness and Harmony, The World Community Service Centre Vethatri Publications Rs 35/- (for All Units)

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**SOFT SKILLS - U13SS**

**Semester** :V

**Soft Skills**

**Instruction Hours/Week: 2**

**Credit: 2**

**Learning objective**

Today’s world is all about relationship, communication and presenting oneself, one’s ideas and the company in the most positive and impactful way. This course intends to enable students to achieve excellence in both personal and professional life.

**Unit I**

Know Thyself / Understanding Self

Introduction to soft skills self discovery – Developing positive attitude – Improving perceptions – Forming values.

**Unit II**

Interpersonal Skills/ Understanding Others

Developing interpersonal relationship –Team building –group dynamics –Net working- Improved work relationship

**Unit III**

Communication Skills/ Communication with others

Art of Listening –Art of reading –Art of speaking –Art of writing –Art of writing emails-e mail etiquette

**Unit IV**

Corporate Skills/ Working with Others

Developing body language –Practising etiquette and mannerism – Time management – Stress management.

**Unit V**

Selling Self/ Job Hunting

Writing resume /cv-interview skills – Group discussion –Mock interview Mock GD –Goal setting –Career planning

**TEXT BOOKS**

Meena. K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A Road Map to Success) P.R. Publishers & Distributors, No, B-20 &21, V.M.M Complex, Chatiram Bus Stand, Tiruchirapalli -620 002.

(Phone No: 0431-2702824; Mobile No: 94433 70597, 98430 7442)

Alex K. (2012) Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD, Ram Nagar, New Delhi -110 055.

Mobile No: 94425 14814(Dr.K.Alex)

**REFERENCE BOOKS**

- (i) Developing the leader within you John C Maxwell
- (ii) Good to Great by Jim Collins
- (iii) The Seven habits of highly effective people Stephen Covey
- (iv) Emotional Intelligence Daniel Goleman
- (v) You can Win Shive Khera
- (vi) Principle centred leadership Stephen Covey

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## GENDER STUDIES - U13GS

**Semester :VI**

**Gender Studies Course**

**Instruction Hours/Week:1**

**Credit: 1**

### **Objectives**

To make boys and girls aware of each other strengths and weakness

To develop sensitivity towards both genders in order to lead an ethically enriched life.

To promote attitudinal change towards a gender balanced ambience and Women empowerment

### **Unit-I**

Concepts of Gender: Sex-Gender-Biological Determinism- Patriarchy- Feminism -Gender Discrimination -Gender Division of Labour -Gender Stereotyping-Gender Sensitivity - Gender Equity —Equality-Gender Mainstreaming Empowerment

### **Unit-II**

Women's Studies Vs Gender Studies: UGC's Guidelines - VII to XI Plans- Gender Studies: Beijing Conference and CEDAW-Exclusiveness and Inclusiveness.

### **Unit III**

Areas of Gender Discrimination: Family Sex Ratio-Literacy -Health -Governance Religion Work Vs Employment- Market - Media - Politics Law Domestic Violence — Sexual Harassment — State Policies and Planning

### **Unit-IV**

Women Development and Gender Empowerment: Initiatives International Women's Decade - International Women's Year - National Policy for Empowerment of Women - Women Empowerment Year 2001- Mainstreaming Global Policies.

### **Unit-V**

Women's Movements and Safeguarding Mechanism:— In India National / State Commission for Women (NCW) - All Women Police Station Family Court- Domestic Violence Act - Prevention of Sexual Harassment at Work Place Supreme Court Guidelines - Maternity Benefit Act - PNDT Act - Hindu Succession Act 2003 Eve Teasing Prevention Act - Self Help Groups 73 and 74 Amendment for PRIS.

## References

- Bhasin Kamala, Understanding Gender: Gender Basics, New Delhi: Women Unlimited 2004
- Bhasin Kamala, Exploring Masculinity: Gender Basics, New Delhi: Women Unlimited, 2004
- Bhasin Kamala, What is Patriarchy? : Gender Basics, New Delhi: Women Unlimited, 1993
- Pernau Margrit Ahmad Imtiaz, Reifeld Hermut (ed.,) Family and Gender: Changing Values in Germany and India, New Delhi: Sage Publications, 2003
- Agarwal Bina, Humphries Jane and Robeyns Ingrid (ed.,)Capabilities, Freedom, and Equality: Amartya Sen's Work from a Gender Perspective, New Delhi: Oxford University Press, 2006
- Rajadurai.S.V, Geetha.V, Themes in Caste Gender and Religion, Tiruchirappalli: Bharathidasan University, 2007
- Misra Geetanjali, Chandiramani Radhika (ed.,) Sexuality, Gender and Rights: Exploring Theory and Practice in South and Southeast Asia, New Delhi: Sage Publication, 2005
- Rao Anupama (ed.,) Gender &Caste: Issues in Contemporary Indian Feminism, New Delhi: Kali for Women, 2003
- Saha Chandana, Gender Equity and Gender Equality: Study of Girl Child in Rajasthan, Jaipur: Rawat Publications, 2003
- Krishna Sumi,(ed.,) Livelihood and Gender Equity in Community Resource Management New Delhi: Sage Publication, 2004
- Wharton .S Amy, The Sociology of Gender: An Introduction to Theory and Research, USA: Blackwell Publishing, 2005.
- Mohanty Manoranjan (ed.,) Class, Caste, Gender: Readings in Indian Government and Politics- 5, New Delhi: Sage Publications,2004.
- Arya Sadhna, Women, Gender Equality and the State, New Delhi: Deep & Deep Publications,2000.

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