NATIONAL COLLEGE (Autonomous)

Nationally Accredited at 'A' Level by NAAC

Tiruchirapalli-620 001.

Under graduate programme structure under CBCS

For candidates admitted from the academic year 2010-2011 onwards

CIA – Continuous Internal Assessment **W – Written Examination**

SEM	PART	COURSE	COURSE TITLE	INS HOURS	CREDIT		MARKS			
							CIA	EXTERNAL		TOTAL MARKS
								W	O	
I	I	Language course-I(LC-I)	Tamil-I/Sans/Hindi	6	3	3	25	75	-	100
	II	English language course –I (ELC-I)	English-I	6	3	3	25	75	-	100
	III	Core Course –I (CC-I)	General Chemistry-I	5	5	3	25	75	-	100
		Core Course –II (CC-II)	Practical –I (Volumetric Analysis)	3	-	*	-	-	-	-
		First Allied Course –I (IAC-I)	Allied Mathematics I	5	3	3	25	75	-	100
		First Allied Course –II(IAC-II)	Allied Mathematics II	3	-	*	-		-	-
	IV	Skill Based Elective Course (SBEC-I)	Office Automation	2	2	3	25	75	-	100
		Total		**30**	**16**					**500**
II	I	Language Course –II(LC-II)	Tamil/Sanskrit/Hindi	6	3	3	25	75	-	100
	II	English Language Course-II (ELC-II)	English-II	4	2	3	25	75	-	100
		Communicative English Course-I EC-I)	Communicative English –I	2	1	3	25	70	5	100
	III	Core Course-II(CC-II)	Practical –I (Volumetric Analysis)	3	5	3	25	70	5	100
		Core Course-III (CC-III)	General Chemistry-II	5	5	3	25	75	-	100
		First Allied Course-II(1AC-II)	Allied Mathematics II	3	3	3	25	70	5	100
		First Allied Course-III (1AC-III)	Allied Mathematics III	5	3	3	25	75	-	100
	IV	Environmental Studies Course (ESC)	Environmental Studies	2	2	3	25	75	-	100
		Total		**30**	**24**					**800**
III	I	Language Course –III(LC-III)	Tamil/Sanskrit/Hindi	6	3	3	25	75	-	100
	II	English Language Course –III(ELC-III)	English-III	4	2	3	25	75	-	100
		Communicative English Course-II(CEC-II)	Communicative English-II	2	1	3	25	70	5	100
	III	Core Course –IV(CC-IV)	General Chemistry-III	5	5	3	25	75	-	100
		Core Course-V(CC-V)	Practical –II (Semi micro Analysis)	2	-	*	-	75	-	-
		Second Allied Course-I (2AC-I)	Allied Physics-I	5	3	3	25	75	-	100
		Second Allied Course-II (2AC-II)	Allied Physics (practical)	2	-	*	-	75	-	-
	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- (Lab) practical	2	2	3	25	75	-	100
		Total		**30**	**18**					**700**

IV	**I**	Language Course –IV (LC-IV)	Tamil /Sanskrit/Hindi	6	3	3	25	75	-	100
	II	English Language Course-IV (ELC-IV)	English-IV	6	3	3	25	75	-	100
	III	Core Course-V(CC-V)	Practical –II (Semi micro analysis)	3	5	3	25	70	5	100
		Core Course-VI(CC-VI)	General Chemistry-IV	5	5	3	25	75	-	100
		Second Allied Course-II(2AC-II)	Allied Physics practical	3	3	3	25	70	5	100
		Second Allied Course-III(2AC-III)	Allied Physics II	5	3	3	25	75	-	100
	IV	Non Major Elective Course -(NMEC-I)	Agricultural Chemistry	2	2	3	25	75	-	100
		Total		**30**	**24**					**700**
V	**III**	Core Course-VII(CC-VII)	Inorganic chemistry-I	5	5	3	25	75	-	100
		Core course-VIII(CC-VIII)	Organic Chemistry-I	5	5	3	25	75	-	100
		Core Course-IX(CC-IX)	Practical-III (Physical Practicals)	2	-	*	-	-	-	-
		Core Course-X(CC-X)	Practical –IV (Gravimetric and Organic Analysis)	3	-	*	-	-	-	-
		Elective Course-I(EC-I)	Analytical chemistry	5	4	3	25	75	-	100
		Elective Course-II(EC-II)	Physical chemistry-I	4	4	3	25	75	-	100
	IV	Non Major Elective course-II(NMEC-II)	Cosmetic Chemistry	2	2	3	25	75	-	100
		Value Education Course-VEC	Value Education Course	2	2	3	25	75	-	100
		Soft skills		2	2	3	25	75	-	100
		Total		**30**	**24**					**700**
VI	**III**	Core Course-IX(CC-IX)	Practical –III (Physical chemistry Practicals)	3	5	3	25	70	5	100
		Core Course-X(CC-X)	Practical-IV (Gravemetric and Organic Analysis)	3	5	3	25	70	5	100
		Core Course-XI(CC-XI)	Inorganic Chemistry-II	6	6	3	25	75	-	100
		Core Course-XII(CC-XII)	Organic Chemistry –II	6	6	3	25	75	-	100
		Core Course- XIII(CC-XIII)	Physical Chemistry-II	6	6	3	25	75	-	100
		Major Based Elective –III(EC-III)	Food chemistry	5	4	3	25	75	-	100
		Gender Studies Course(GSC)	Gender Studies	1	1	3	25	75	-	100
		Total		**30**	**33**					**700**
	v	Extension Activities		-	1	-	-	-	-	-
		Grand Total		**180**	**140**					**4000**

O- Oral **Sem –Semester**

*Examinations will be in the even semester.

There will be oral test for all practical examination and communicative English courses.

The oral test will carry 5 marks in the external component.

nraAs; (,fifhy ,yf;fpak) ciueil rWfij ,yf;fpa tuyhW gad;Kiwj;jko; -

U13T1

gUtk; : l **ghlk; : l**

fwg;f;Fk; fhyk; : 6 **jugGs;s; : 3**

myF - 1:

ghuj;ahu ft;ijfs :]u] tj; Njt;a;d Gfo ghuj ehL

ghuj;jhrd ft;ijfs : jko;d ,d;ik ,dgjjko;
cyfk cdDilaJ nfhlL KuNr

glLfNfhlilahu ft;ijfs: ciogGk Njit
,td NrhW NghLf;whd mtd $W NghLf;whd

ehkffy ft;Qu ghlyfs : ,sejko;DfF

fzzjhrd ft;ijfs : ghLtJ ehdyy

myF - 2:

mgJy uFkhd : kz

ituKjJ : ghuj; e;idffggLf;whd

Nkjjh : nrUgGld xU Nglb

kuh : Ntfk; jko;oggwW Ruzlyhkh?r;tgGehlh;
fhjNyh fhjy;goffk nghyyhjJ

,dFyhg : xU Gddifr rk;fifahy

mKjghuj; : i`f$

ehlLgGwg ghlyfs : xgghu;g ghly - gr;ahwg Nghtj;yiy

myF - 3:

ciueil:

ghuj;ahu - j;ahdqfSk kej;uqfSk

j;U.t;.f. - kd;jd

c.Nt.rh - vJ jko;?

uh.g;. NrJgg;sis - FbAk gilAk

K.t. - nkho; ,yyhj e;iy

GJikgg;jjd - jko;oh ehfu;fjj;y

f;uhkthof;if

fyf; - G+idfs;d Ntiy e;Wjjk

r;.vd. mzzhJiu - gwW

R[hjh - flTs ,Uff;whuh?

myF - 4: rWfij:

t;bay fhyk - Kidtu ,uh.ghyRgukz;ad

myF - 5:

,yf¡f¡a tuyhW - ,Ugjhk E}wwhzL
(Gj¡dk› ehlfk eqfyhf)

gad¡Kiwj¡jk¡o¡ - ty¡k¡Fk t¡j¡fs¡d njhFgG k¡fhikfFu¡a t¡j¡fs (eyy jk¡o vOj NtzLkh gf.260 - 290.

ghlE}y¡:

1. nraAs› ciueil - fyY}u¡ nts¡aL
2. r¡Wfij - t¡bayfhyk›
   Kidtu ,uh. ghyRgukz¡ad.
3. ,yff¡a tuyhW - nghJ
4. gadKiwjjk¡o - eyyjk¡o vOjNtzLkh›
   m.f¡. guejhkdhu› gf.260-290

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nra¡As¡ (,ilf¡fhy ,yf¡f¡ak)› Gj¡dk› ,yf¡f¡a tuyhW

nra¡As¡ - U13T2

gUtk¡ : II **ghlk¡ : II**

fwg¡f¡Fk¡ fhyk¡ : 6 **jugGs¡s¡ : 3**

myF - 1

1.1 j¡UQhdrkgeju Njthuk- j¡UfNfhbffh j¡Ujjyk (11 ghlyfs) ,dW..
1.2. j¡UehTffuru Njthuk- j¡UgGfY}u j¡Ujjyk (10 ghlyfs) kUsth..
1.3. Rejuu Njthuk- j¡Uthidffh j¡Ujjyk (10 ghlyfs) kiwfs...
1.4. khz¡ffthrfu- j¡Uthrfk - j¡Untkghit (10 ghlyfs) Mj¡Ak...

myF - 2

2.1. Mzlhs- j¡Ugghit (10 ghRuqfs) Xqf¡
2.2. njhzlubgnghbahothu-j¡Ukhiy (10 ghRuqfs) grir
2.3. j¡Ugghzhothu-mkydhj¡g¡uhd (10 ghRuqfs)
2.4. FyNrfuhothu-ngUkhs j¡Unkho¡ (11 ghRuqfs) CNdW

myF - 3

3.1. - KjJfFkhurhk¡ g¡sisjjk¡o (2 ghlyfs)
3.2 - eej¡ffykgfk - 5 ghlyfs
3.3. - Kf$lwgsS - 5 ghlyfs
3.4. - xsitahu ghlyfs - 4 ghlyfs
3.5. - fhsNkfgGytu ghlyfs - 3 ghlyfs

3.6. - rfj;Kjjg Gytu ghly - 1 ghly

3.7. - fkgu ghlyfs - 3 ghlyfs

myF - 4

Gj;dk - rKjha tj; - eh. ghujjrhuj;

myF - 5

5.1. ,yf;f;a tuyhW

5.1.1. - gfj; ,yff;ak [irtk› itztk]

5.1.2. - r;ww;yff;ak [g;sisjjk;o› fykgfk›gsS

5.1.3 - Gj;d ,yff;ak

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fhgg;ak› ehlfk› ,yf;f;atuyhW - U13T3

gUtk; : III **ghlk; : III**

fwg;f;Fk; fhyk; : 6 **jugGs;s; : 3**

myF - 1

1. r;yggj;fhuk (,sqNfhtbfs) - tofFiu fhij

2. kz;Nkfiy (rjjiyrrhjjdhu)- Mj;iu g;rira;ll fhij

myF - 2

3. fkguhkhazk (fkgu) - ,uhkhtjhuk - fhlr;gglyk

4. ngu;aGuhzk (Nrff;ohu)- G+ryhu ehadhu Guhzk

myF - 3

5. ,NaRfht;ak (fzzjhrd) - kiygngho;T

6. rwhgGuhzk (ckWgGytu) - khDfFg g;izej;dw glyk

myF - 4 :

7. jzzu jzzu (Nfhky Rthk;ehjd)- ehlfk

myF - 5

8. ,yff;atuyhW - fhgg;ak› Guhzk› ehlfk

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gz;il ,yf;fpak> ,yf;fpa tuyhW> nkhopgga;wr; - U13T4

gUtk; : IV **ghlk; : IV**

fwg;f;Fk; fhyk; : 6 **jugGs;s; : 3**

myF - 1

1. FWenjhif - 10 ghlyfs (8>18>25>40>58>99>131>135>167>196)
2. ewwpiz - 5 ghlyfs (1> 3> 16> 30> 355)
3. IqFE}W - 10 ghlyfs (nryT mOqFtpjjggjJ)

myF - 2

4. fypjnjhif - 2 ghlyfs (FwpQrpffyp - 15> Kyiyffyp - 11)
5. mfehD}W - 2 ghlyfs (129> 140)
6. GwehD}W - 10 ghlyfs (95>165>182>183>184>188>194>195>204)

myF - 3

7. jpUfFws - mwjJgghy 5 mjpfhuqfs (11> 13> 14> 43> 47)

myF - 4

8. gjJgghlL - KyiygghlL KOtJk (egG+jdhu)

myF - 5

,yffpa tuyhW-vlLjnjhif> gjJgghlL> gjpndz foffzfF> nkhopgga;wrp - nghJfflLiu (nghJ mwpT> ehlLelgG> rKjha NehfF gwwpad)

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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

Unit III

R.P. Sisodia	The Last Salvation
Kasturi Sreenivasan	I Prepare to gotoCoimbatore

Unit IV

F.E.B. Gray	A Slip of the Tongue
Ruskin Bond	The Eyes are not Here

Unit V

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 (2nd edition) by Krishnasamy and Sriraman.

Reference: Websites www.english club.com
www.using english.com
Owl-online writing lab
MIT-open course ware
www.eslcafĕ.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:

Unit: I	John Milton	:	On His Blindness
	Oliver Goldsmith	:	The village Schoolmaster
	William Wordsworth	:	The Solitary Reaper
UNIT II	P.B.Shelley: Ozymandias		
	John Keats	:	La Belle Dame Sans Merci
	Browning	:	Incident of the French Camp
UNITIII	John Masfield	:	Laugh and Be Merry
	Robert Frost	:	Stopping By the Woods On a Snow Evening
	John Drink water	:	The Vagabond

DRAMA:

Unit: IV	Anton Chekhov	:	The Bear
	Norman Mckinnel	:	The Bishop's Candlesticks
Unit: V	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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GENERAL CHEMISTRY I – U13CH1

Semester: I **Core Course : I**
Instruction Hours/Week: 5 **Credit : 5**

UNIT I: Electronic Structure and Periodic Properties

Quantum numbers - principal, azimuthal, magnetic and spin quantum numbers and their significance - principles governing the occupancy of electrons in various quantum levels - Pauli's exclusion principle - Aufbau principle - Hund's rule - (n+l) rule - stability of half-filled and fully-filled orbitals.Periodic properties -variation of atomic volume, atomic and ionic radii, ionization potential, electron affinity and electronegativity along periods and groups - factors affecting periodic properties Pauling's and Mulliken's scales of electronegativity.

UNIT II: Chemical Bonding

Ionic bond - lattice energy and Born-Haber cycle (no derivation).Covalent bond - polarity of bonds - Fajan's rules - degree of covalent character in ionic bond.VSEPR theory - shapes of simple inorganic molecules containing lone pairs and bond pairs of electrons ($BeCl_2$, NH_3, H_2O, PCl_5, SF_6, IF_7).Hydrogen bonding - properties, types and consequences.Intermolecular forces - London forces.

UNIT III: Organic Chemistry

Catenation and classification of organic compounds.Hybridisation and geometry of molecules - methane, ethane, ethylene and acetylene - bond length, bond angles and bond energy.Polarisation effects - inductive effect, electromeric effect, mesomeric effect, hyperconjugation and steric effects.Cleavage of bonds - hemolytic and heterolytic fission of C-C bonds.Reaction intermediates - free radicals, carbocations, carbanions - structure and their statbility.

UNIT IV: Physical Chemistry

Gaseous state - The Gas constant "R" in different units - deviation from ideal behavior -Van der Waal's equation for real gases.Critical Phenomena - PV isotherms of real gases, critical temperature, continuity of state - relation between critical constants and Vander Waal's constants - Determination of critical volume - the law of corresponding states - reduced equation of state. Molecular velocities Root mean square, average and most probable velocities (derivation from Maxwell-Boltzmann distribution equation) - Maxwell-Boltzmann distribution of molecular velocities (no derivation) - Collision number and mean free path - Collision diameter.

UNIT V: Physical Chemistry

Solutions - Definition of ideal and nonideal solutions - concentration units - molality - molarity - formality - mole fraction - normality - weight percent and volume percent - activity and activity coefficient.

Macromolecules - Number average and weight average molecular weight of macromolecules - determination of molecular weight by osmometry (number average), ultra centrifuge (weight average), Viscometry and light scattering.

References:

01. P. L. Soni, Mohan Katyal, "Text book of Inorganic Chemistry", 20th Revised Edition (2007), Sultan Chand & Sons, New Delhi.

02. R. D. Madan, "Modern Inorganic Chemistry", 2nd Edition (2008), S. Chand and Company Ltd., New Delhi.

03. B.S. Bahl and Arun Bahl, "Advanced Organic Chemistry," S .Chand and Company Ltd., New Delhi.

04. P. L. Soni, "Text book of Organic Chemistry", S. Chand and Company Ltd.,New Delhi.

05. P. L. Soni and H. M. Chawla, "Text book of Organic Chemistry", (1994), Sultan Chand & Sons, New Delhi.

06. R. D. Madan, J. S. Tiwari and G. L. Mudhara, "A text book of First Year B.Sc. Chemistry", S. Chand and Company Ltd., New Delhi.

07. B. R. Puri and Sharma, "Principles of Physical Chemistry", Meerut Publications, Meerut.

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PRACTICAL I : VOLUMETRIC ANALYSIS– U13CH2P

Semester : I & II **Core Course : II**
Instruction Hours/Week : 3+3 **Credit : 6**

1. Estimation of HCl by NaOH using standard H_2SO_4 solution.
2. Estimation of HCl by NaOH using standard oxalic acid solution.

3. Estimation of Na_2CO_3 by HCl using standard Na_2CO_3 solution.

4. Estimation of oxalic acid by $KMnO_4$ using standard oxalic acid solution.

5. Estimation of $FeSO_4$ by $KMnO_4$ using standard Mohr's salt solution.

6. Estimation of $KMnO_4$ by thio using standard $K_2Cr_2O_7$ solution.

7. Estimation of Fe^{2+} ion by $K_2Cr_2O_7$ using standard Mohr's salt solution.

8. Estimation of $CuSO_4$ by thio using standard $K_2Cr_2O_7$ solution.

9. Estimation of Ca(II) by EDTA solution.

10. Estimation of As_2O_3 by I_2 solution using standard As_2O_3 solution.

11. Estimation of Total Hardness of Water (Demonstration only)

<u>Scheme of Valuation</u>

Maximum Marks: 75 Marks

Record : 10 Marks

Procedure Writing : 10 Marks

Viva-voce : 05 Marks

Practical : 50 Marks

< 1% 50 Marks

1-2% 40 Marks

2-3% 30 Marks

3-4% 15 Marks

> 4% 10 Marks

Wrong Calculation: Reduce 5 Mark

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GENERAL CHEMISTRY II – U13CH3

Semester : II **Core Course : III**
Instruction Hours/Week : 5 **Credit : 5**

UNIT I: Titrimetric Analysis

Volumetric analysis - definitions - standard solutions, equivalence point, end point, molarity, molality, normality, mole fraction, primary and secondary standards - types of titrimetric reactions - acid-base, redox, precipitation and complexometric titrations - acid-base and redox indicators.Oxidation-reduction: oxidation number and oxidation states - equivalent weights of oxidizing and reducing agents - balancing redox equations by oxidation number method and ion-electron method.

UNIT II: Metallurgy and s-block Elements

Metallurgy - various steps in metallurgy - grinding, pulverizing - concentration (ore dressing) - hand picking, gravity separation, froth floatation, electromagnetic separation, chemical separation - calcinations and roasting - smelting, aluminothermic process - purification of metals - zone refining, vapour phase and electrolytic refining.Position of hydrogen in the periodic table - atomic hydrogen - nascent hydrogen, occluded hydrogen, ortho-para hydrogen.General characteristics of s-block elements and their compounds - oxides, hydroxides, halides and hydrides - diagonal relationship of Li and Mg, Be and Al - extraction of Li and Be - anomalous behaviour of Li and Be

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UNIT III: Organic Chemistry

Nomenclature of organic compounds - IUPAC naming of simple and substituted aliphatic, aromatic and alicyclic compounds - priorities of functional groups in polyfunctional compounds (not more than).Alkanes - general methods of preparation, properties and uses.Petroleum - refining, products obtained with uses - cracking - thermal and catalytic process of cracking - synthetic gasoline - Fischer-Tropsch synthesis and Bergius method - octane number.Alkenes - general methods of preparation and properties - addition with HBr (peroxide effect), H_2SO_4, H_2O, hydroboration, ozonolysishydroxylation with $KMnO_4$ - allylic substitution by NBS.

UNIT IV: Organic Chemistry

Dienes - types - conjugated, isolated and cumulated.Synthesis of dienes - 1,3-butadiene, isoprene and chloroprene.Stability and chemical reactivity - 1,2 and 1,4 additions - kinetically and thermodynamically controlled reactions - Diel's-Alder reaction.Alkynes - acidity of alkynes - formation of acetylides - addition of water with $HgSO_4$ catalyst - addition of halides and halogens - oxidation and hydroboration (mechanisms not needed).

UNIT V: Physical Chemistry

Collidal state- size of colloidal particles –peptization , stability of colloids , cogulation and Protection –reverse Osmosis and desalination of sea water –Donnan membrane equilibrium electrophoresis and separation of proteins ,Gels and emulsions.

Liquid state –liquid crystals –classification, structure, properties and applications .

References:

1.P. L. Soni, Mohan Katyal, "Text book of Inorganic Chemistry", 20th Revied Edition (2007), Sultan Chand & Sons, New Delhi.

2.R. D. Madan, "Modern Inorganic Chemistry", 2nd Edition (2008), S. Chand and Company Ltd., New Delhi.

3.B.R.Puri, L.R.Sharma and K.C.Kalia, "Principles of Inorganic Chemistry",30th Edition (2008), Milestone Publishers and Distributors, New Delhi.

4.B. S. Bahl and Arun Bahl, "Advanced Organic Chemistry," S.Chand and Company Pvt. Ltd., New Delhi.

5.P. L. Soni, "Text book of Organic Chemistry", S. Chand and Company Ltd., New Delhi.

6.P.L.Soni and H.M.Chawla, "Text book of Organic Chemistry" (1994), Sulta Chand & Sons, New Delhi.

7.D.N.Bajpai, "Advanced Physical Chemistry" S.Chand and Company Ltd., New Delhi.

8. Bruce H.Mahan, "University Chemistry" Narosa Publishers, New Delhi1989

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GENERAL CHEMISTRY III – U13CH4

Semester : III **Core Course : IV**
Instruction Hours/Week : 5 **Credit : 5**

UNIT I: Oxygen Family and Qualitative Analysis

Oxygen family - Comparative study - preparation, properties, structural elucidation and uses of ozone, hydrogen peroxide, peracids of sulphur and sodium thiosulphate.Principles of qualitative analysis - solubility product - common ion effect - complexation reactions including spot tests in qualitative analysis.

UNIT II: Boron, Carbon and Nitrogen Family

Comparative study of boron family elements - compounds of boron - diborane, borax, boron nitride, boron carbide and borazole - structure and uses.Comparative study of carbon family elements and their compounds (hydrides, halides and oxides) **-** chemistry of cyanogens - structure of graphite and diamondComparative study of nitrogen family elements and their compounds (hydrides, halides, oxides and oxyacids) - chemistry of hydrazine.

UNIT III: Cycloalkanes and Conformational Analysis

Cycloalkanes: Nomenclature - preparation using wurtz reaction, Dieckmann ring closure reactions and reduction of aromatic hydrocarbons - chemical properties. Substitution and ring opening reactions - relative stability of cycloakanes (cyclopropae to cyclooctane), Baeyer's strain theory, limitations – Sasche-Mohr theory of strainless rings.Conformational Analysis: Ethane, n-butane, cyclohexane, mono and disubstituted cyclohexane.

UNIT IV: Alcohols

Alcohols: Classification and nomenclature - monohydric alcohols - preparation by reduction of aldehydes, ketones, carboxylic acids and hydrolysis of esters - individual source of alcohols. Properties: acidic nature, H-bonding, Reactions involving cleavage of -OH bond, C-O bond. Distinction between 1^0, 2^0 and 3^0 alcohols, Dihydric alcohols: prepartion, Properties and uses of glycol. Trihydric alcohols: preparation - properties and uses. Reactions of polyhydric alcohols with $Pb(OAC)_4$, HIO_4 and OsO_4.

UNIT V: Chemical Kinetics

Rates of reaction, rate laws, rate constants, order and molecularity of reactions. Rate equations for zero, first, second and third order reactions. Derivation of rate constants for first, second order reactions. Fractional order reactions - examples, half-life period, pseudo-first order reactions - examples.

Methods of determining the order of reactions. Integration, graphical, half-life and Ostwald's isolation methods.Temperature dependence of reaction rates - Arrhenius parameters and calculations.Theories of reaction rates - simple collision theory - Limitations - Steady state approximation - Lindemann's hypothesis of unimolecular reactions - theory of absolute reaction rates.

References:

1.P. L. Soni, Mohan Katyal, "Text book of Inorganic Chemistry", 20th Revised edn., (2007), Sultan Chand & Sons, New Delhi.

2.R.D.Madan,"Modern Inorganic Chemistry", 2nd edn., (2008), S.Chand and Company Ltd., New Delhi.

3. B.S.Bahl and Arun Bahl, "Advanced Organic Chemistry," S.Chand and Company Ltd., New Delhi.

4. P.L.Soni, "Text book of Organic Chemistry", S. Chand and Company Ltd., New Delhi.

5. P. L. Soni and H. M. Chawla, "Text book of Organic Chemistry", (1994), Sultan Chand & Sons, New Delhi.

6. K.S.Tewari and N.K.Vishnoi, "A Text book of Organic Chemistry", (2006), 3rd edition, Vikas Publishing House Pvt. Ltd.

7. M.K.Jain, "OrganicChemistry" 12thedition, ShobanLal Nagin Chand and Co.

8. R. D. Madan, J. S. Tiwari and G. L. Mudhara, "A text book of First Year B.Sc. Chemistry", S. Chand and Company Ltd., New Delhi.

9. B.R.Puri and Sharma, "Principles of Physical Chemistry", Publications, Meerut.

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PRACTICAL II: SEMIMICRO ANALYSIS – U13CH5P

Semester : III & IV **Core Course : V**
Instruction Hours/Week : 2+3 **Credit : 5**

Inorganic Qualitative Analysis

Analysis of a mixture containing two cations and two anions of which one will be an interferring ion. Semimicro methods using the conventional scheme with hydrogen sulphide may be adopted. **Cations to be Studies:** lead, copper, bismuth, cadmium, antimony, tin, iron, aluminium, zinc, manganese, cobalt, nickel, barium, calcium, strontium, magnesium and ammonium **Anions to be studies:** Carbonate, Sulphide, Sulphate, nitrate, chloride, bromide, fluoride, borate, oxalate, arsenite, arsenate and phosphate

Reference:

1. V. Venkateswaran, R. Veerasamy, A. R. Kulandaivelu, Basic principles of Practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons (1997)

Scheme of Valuation

Maximum Marks: 75 Marks

Practical	: 60 marks
Record	: 10 marks
Viva-Voce	: 05 marks
Total	: 75 marks

4 radicals correct with suitable tests	:	60 marks
3 radicals correct with suitable tests	:	45 marks
2 radicals correct with suitable tests	:	30 marks
1 radical correct with suitable tests	:	15 marks

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GENERAL CHEMISTRY IV - U13CH6

Semester: IV **Core Course : VI**
Instruction Hours/Week : 5 **Credit : 5**

UNIT I: Halogen Family and Zero Group Elements

Comparative study of halogens and their compounds - oxides and oxy acids of halogens (structure only) - estimation of available chlorine in bleaching powder - basic properties of halogens. Interhalogen compounds - preparation, properties and uses - pseudo halogens - preparation, properties and uses of

cyanogens and thiocyanogen - comparison with halogens.Zero group - position in the periodic table - isolation of noble gases from the atmosphere and uses - compounds of xenon - XeF_2, XeF_4, XeF_6, XeO_3, $XeOF_4$ - strucutre and uses.

UNIT II: Ethers, Epoxides, Organometallic Compounds

Ethers**:**Nomenclature, preparation, properties.Epoxides: Preparation and properties.Organometallic Compounds**:** Grignard reagents - laboratory preparation, properties and uses. Tetraethyl lead (TEL) - preparation, properties and uses.

UNIT III: Aromaticity

Structure of benzene - stability, resonance structure, VBT of aromaticity, Huckel's rule of aromaticity (benzene, naphthalene and anthracene). Electrophilic Substitution reactions (mechanism of nitration, halogenation, Friedel-crafts alkylation).

UNIT IV: Solid State

Isotropic and anisotropic solidsNature of the solid state - Seven crystal system-Bravais lattice, unit cell, law of rational indices,(Weiss indices) Miller indices, Symmetry elements in crystals (for cubic system only in detail).X-ray diffraction by crystals - derivation of Bragg's equation - Bragg method - powder method. Crystal structure of NaCl, KCl, ZnS and CsCl - radius ratio and packing in crystals.Vitreous state

UNIT V: Quantum Chemistry

Quantum theory and atomic spectra Bohr's model of atoms - Bohr's theory of Hydrogen atom and spectral lines. Limitations of Bohr's model. Sommerfeld's extension. Photoelectric effect and Compton Effect. de-Broglies equation and verification.Heisenberg's uncertainty principle - Schodinger wave equation - Eigen values and eigen functions- significance of ψ and ψ^2 - Radial and angular distribution function - concept of orbital and shapes of orbitals.

References:

1. P. L. Soni, Mohan Katyal, "Text book of Inorganic Chemistry", 20th Revised edn., (2007), Sultan Chand & Sons, New Delhi.
2. R. D. Madan, "Modern Inorganic Chemistry", 2nd edn., (2008), S. Chand and Company Ltd., New Delhi.
3.B.R.Puri, L.R.Sharma and K.C.Kalia, "Principles of Inorganic Chemistry",30th Edn.(2008),Milestone Publishers and Distributors,New Delhi.
4. B.S.Bahl and ArunBahl, "Advanced Organic Chemistry," S.Chand and Company Ltd., New Delhi.
5.P.L.Soni, "Text book of Organic Chemistry", S.Chand and Company Ltd., New Delhi.

6. P.L.Soni and H. M. Chawla, "Text book of Organic Chemistry", (1994), Sultan Chand & Sons, New Delhi.
7.K.S.Tewari and N.K.Vishnoi, "A Text book of Organic Chemistry", (2006), 3rd edition, Vikas Publishing House Pvt. Ltd.
8. M.K.Jain "Organic Chemistry"12th edition, ShobanLal Nagin Chand and Co.
9. D.N.Bajpai, "Advanced Physical Chemistry", S. Chand and Company Ltd., New Delhi.
10. Bruce H.Mahan, "University Chemistry", Narosa Publishers, NewDelhi.1989

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U13CH7 – INORGANIC CHEMISTRY - I

Semester: V **Core Course : VII**
Instruction Hours/Week : 5 **Credit : 5**

UNIT I: Transition and Inner Transition Elements

Group study of Titanium, Vanadium, Chromium, Manganese and Iron groups - Metallurgy of Ti, V and W. Lanthanides and Actinides - general study involving electronic configuration, Oxidation state, magnetic properties and complexation behaviour - lanthanide and actinide contraction - comparative study of lanthanides and actinides.Chemistry of Thorium and Uranium.

UNIT II: Coordination Chemistry - I

Types of ligands - IUPAC NomenclatureTheories of coordination compounds - Werner, Sidgwick, Valence bond, Crystal field, Molecular orbital and Ligand field theory.

UNIT III: Coordination Chemistry - II

Isomerism - stability of complexes - factors affecting stability.Unimolecular and bimolecular nucleophilic substitution reactions in octahedral and square planar complexes - trans effect.Application of coordination compounds - separation of copper and cadmium ions - estimation of nickel using DMG and aluminium using oxine.Structure of EDTA and its complexes - complexometric titrations - principle and applications.

UNIT IV: Metal Carbonyls and Nitrosyls

Biologically important coordination compounds - Chlorophyll, Hemoglobin and Vitamin B_{12} - structure and applications (elucidation not required).Metal carbonyls - mono and polynuclear carbonyls of Ni, Fe, Cr, Co and Mn - Synthesis, reaction , structure and uses.Nitrosyl compounds - classification**,** preparation and properties - structure of nitrosyl chloride and sodium nitroprusside.

UNIT V: Gravimetry and Group Theory

Characteristics of precipitating agents - choice of precipitants - specific and selective precipitant - conditions for precipitation - types of precipitants - purity of precipitants - co-precipitation and post precipitation - digestion and washing of precipitates - ignition of precipitates - uses of sequestering agents. Symmetry elements - symmetry operation - point group of simple molecules (H_2, HCl, CO_2, H_2O, BF_3 and NH_3).

References:

01. P. L. Soni, Mohan Katyal, "Text book of Inorganic Chemistry", 20th Revised edn., (2007), Sultan Chand & Sons, New Delhi.

02. R. D. Madan, "Modern Inorganic Chemistry", 2nd edn., (2008), S. Chand and Company Ltd., New Delhi.

03. J. D. Lee, Consise Inorganic Chemistry, ELBS, 4 th edn.,

04. R. Gopalan, P. S. Suramanian and K. Rangarajan, Elements of Analytical chemistry, Sultan Chand & Sons, New Delhi, 1995.

05. P.K. Bhattacharya, Chemical applications of group theory, Himalaya Publishing House, Mumbai, 1998.

06. M. S. Gopinath and V. Ramakrishnan, Group theory and application, 1998

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ORGANIC CHEMISTRY I - U13CH8

Semester: V **Core Course : VIII**
Instruction Hours/Week :5 **Credit : 5**

UNIT I: Stereochemistry

Stereoisomerism - definition - classification - optical isomerism - optical activity - specific rotation - criteria for optical activity - asymmetric centre - chirality - achirality - D,L and d, l, rotations - elements of symmetry.Optical activity of lactic acid, tartaric acid, biphenyls, allenes and spiranes.Racemisation - Racemisation by susbsitution - resolution - methods of resolution by mechanical, seeding and biochemical - asymmetric synthesis - partial and absolute asymmetric synthesis - Walden inversion - R, S notation of acyclic compounds with one or two asymmetric centres - Erythro and threo representations.

UNIT II: Stereoisomerism and Heterocyclic Compounds

Geometrical isomerism - cis-trans, syn-anti and E-Z rotation - geometrical isomerism in maleic and fumaric acids, unsymmetrical ketoximes - methods of distinguishing geometrical isomers (Dipole moment, dehydration, heat of hydrogenation, cyclisation, melting points).Aromatic characteristics of heterocyclic compounds. Comparison of basicity of pyrrole, pyridine and amines.Preparation, Properties

and uses of furan, pyrrole, thiophene, quinoline, isoquinoline and involve (Skraup synthesis and Bischler - Napieralski synthesis).

UNIT III: Carbonyl Compounds and Photochemistry

Carbonyl polarization - acidity of α-hydrogen - mechanism of aldol, perkin, knoevengal, benzoin, cannizaro, claisen, reformatsky and wittig reactions.Mechanism of reduction - $NaBH_4$, $LiAlH_4$, Wolff-Kishner and MPV reactions. Holoform, Michael addition and Oppenauer oxidation.Photochemistry of Carbonyl compounds - Norrish I and II types.

UNIT IV: Acids and Acid Derivatives

Ionisation of carboxylic acids - acidity constant - comparison of acid strengths of substituted acids - acid strength of substituted benzoic acids - hammett equations.Dicarboxylic acids - oxalic, malonic, succinic acids (Preparation, Properties and uses).Malonic and acetoacetic ester - characteristics of reactive methylene group - synthetic uses of these two esters.

UNIT V: Tautomerism and Vitamins

Tautomerism - definition, types - keto-enol-identification, acid and base catalysed interconversion mechanisms - amido-imido and nitro-acinitro tautomerism (Only interconversion).Vitamins - types - sources - deficiency disorders. Structure of Vitamin A, B_6, B_2 and C. Structural elucidation of riboflavins and ascorbic acid.

Reference:

01. P. L. Soni and H. M. Chawla, (1997), Text book of Organic Chemistry, 27th edition, S.Chand and Sons.

02. K. S. Tewari and N. K. Vishnoi, (2006), A Text book of Organic Chemistry, 3rd edition, Vikas Publishing House, Pvt. Ltd.

03. M. K. Jain, Organic Chemistry, 12th edition, Shoban Lal Nagin Chand and Co.

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ANALYTICAL CHEMISTRY – U13CH9E

Semester : V **Elective Course : I**

Instruction Hours/Week : 5 **Credit : 4**

UNIT I: Introduction to Analytical Chemistry

Types of analytical methods: Importance of analytical methods in qualitative and quantitative analysis - chemical and instrumental methods - advantages and limitations of chemical and instrumental methods.Laboratory Hygiene and safety: Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous chemicals.Simple first aid procedures for accidents involving acids, alkalies, bromine, burns and cut by glass. Threshold vapour concentration - safe limits - Waste disposal and fee

me disposal.Evaluation of analytical data: Idea of significant figures - its importance. Accuracy - methods of expressing accuracy - error analysis - types of errors-minimizing errors. Precision - methods of expressing precision - mean, median, mean deviation, standard deviation and confidence limit. Method of least squares - problems involving straight line graphs.

UNIT II: Quantitative Analysis

Estimations of commercial samples - determination of percentage purity of samples -pyrolusite, Iron ore, washing soda and Bleaching power - estimation of glucose and phenol. Gravimetric analysis - principle - theories of precipitation - solubility product and precipitation - conditions of precipitations- types of precipitants - specific and selective precipitants - organic and inorganic precipitants - types of precipitation - purity of precipitates - co precipitation - post precipitation - precipitation from homogeneous solution - use of sequestering agent.

UNIT III: Thermo and Electroanalytical Techniques

Thermo analytical methods: Principle of thermo gravimetry, differential thermal analysis, differential scanning calorimetry - Instrumentation for TGA, DTA and DSC - Characteristics of TGA and DTA curves - factors affecting TGA and DTA curves - applications - TGA of calcium oxalate monohydrate DTA of calcium acetate monohydrate.Electro analytical techniques - electro gravimetry - theory of electro gravimetric analysis determination of copper (by constant current procedure) - electrolytic separation of metals : Principle - separation of copper and nickel, coulometry : principle of coulometric analysis - coulometry at controlled potential - apparatus and technique.

UNIT IV: Spectro Analytical Techniques

Colorimetry and spectrophotometry - Beer-Lambert's law - principle of colorimetric analysis - visual colorimetry - standard series method - balancing method - estimation of Ni^{2+} and Fe^{3+} colorimetrically - photoelectric photometer method - infrared spectroscopy (instrumentation only) - block diagram - source - monochromator - cell - detectors and recorders - sampling techniques - NMR spectroscopy (instrumentation only)

UNIT V: Chromatography Techniques

Column chromatography - principle, types of adsorbents, preparation of the column, elution, recovery of substances and applications. Thin layer chromatography - principle, choice of adsorbent and solvent, preparation of chromatoplates, R_f-values, factors affecting the R_f-values, Significance of Rf-values. Paper chromatography - principle, solvents used, development of chromatogram, ascending, descending and radial paper chromatography. Paper electrophoresis - separation of amino acids - applications. Ion-exchange chromatography - principle - types of resins - requirements of a good resin -

action of resins - experimental techniques - separation of Na-K and Ca-Mg. Gas chromatography - principle - experimental techniques - instrumentation and applications.

References:

1. A. Douglas, Skoog, D. M. West and F. J. Holler, Fundamentals of Analytical Chemistry, 7th edition, Harcourt College Publishers.
2. J. Mendham, R. C. Denney, J. D. Barnes, M. Thomas, Vogel's Text book of Quantitative Chemical analysis 6th edition Pearson education.
3. B. K. Sharma, Instrumental Methods of Chemical Analysis, Goel Publishing House, Merrut, (1997).
4. R. Gopalan, P. S. Subramaniam and K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand and Sons.
5. S. Usharani, Analytical Chemistry, Macmillian.

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PHYSICAL CHEMISTRY – I – U13CH10E

Semester : V **Elective Course : II**

Instruction Hours/Week : 4 **Credit : 4**

UNIT I: Thermodynamics - I

System and surrounding - isolated, closed and open systems - state of the system - Intensive and extensive variables. Thermodynamic processes - reversible and irreversible, isothermal and adiabatic processes - state and path functions - exact and inexact differentials. Work of expansion at constant pressure and free expansion. First law of thermodynamics - statement - definition of internal energy (E), enthalpy (H) and heat capacity. Relation between Cp and Cv. calculation of w, q, dE and dH for expansion of ideal and real gases under isothermal and adiabatic conditions of reversible and irreversible processes. Definition of Joule-Thomson coefficient c calculation of ($\mu_{J,T}$) for ideal and real gases - Inversion temperature.Thermochemistry - relation between enthalpy of reaction at constant volume (q_v) and at constant pressure (q_p) - temperature dependence of heat of reaction - Kirchoffs equation -bond energy and its calculation from thermochemical data. Integral and differential heats of solution and dilution.

UNIT II: Thermodynamics - II

Second law of thermo dynamics - need for the law - different statements of the law - Carnot's cycle and efficiency of heat engine - Carnot's theorem - thermodynamic scale of temperature - concept of entropy - definition and physical significance of entropy - entropy as a function of P, V and T - entropy changes during phase changes - entropy of mixing - entropy criterion for spontaneous and equilibrium

processes in isolated system - Gibb's free energy (G) and Helmholtz free energy (A) - variation of A and G with P, V and T - Gibb's - Helmholtz equation and its applications - thermodynamic equation of state - Maxwell's relations - ΔA and ΔG as criteria for spontaneity and equilibrium - advantage of ΔG over entropy change.

UNIT III: Thermodynamics - III

Equilibrium constant and free energy change - thermodynamic derivation of law of mass action - equilibrium constants in terms of pressure and concentration - NH_3, PCl_5, - thermodynamic interpretation of Le Chatelier's principle (Concentration, temperature, pressure and addition of inert gases.) - partial molar quantities - chemical potential - Gibb's Duhem equation. van't Hoff's reaction isotherm - van't Hoff's isochore - Clapeyron equation and Clausius-Clapeyron equation – applications - third law of thermodynamics - Nernst heat theorem statement of III law and concept of residual entropy - Exception to III law (ortho and para hydrogen, CO, N_2O and ice)

UNIT IV: Solutions

Ideal and non-ideal solutions-concept of activity and activity coefficients - completely miscible liquid systems - benzene and toluene. Raoult's law and Henry's law. deviation from Raoult's law and Henry's law. Duhem-Margules equation - theory of fractional distillation - azeotropes - HCl-water and ethanol-water systems - partially miscibe liquid systems - phenol-water, triethanolamine - water and nicotine-water systems - lower and upper CSTs - effect of impurities on CST - completely immiscible liquids - principle and applications of steam distillation. Nernst distribution law - derivation.applications - determination of formula of a complex ($KI + I_2 = KI_3$) - solvent extraction principle and derivation of a general formula of the amount unextracted - dilute solutions:colligative properties, relative lowering of vapour pressure, osmosis, law of osmotic pressure, thermodynamic derivation of elevation of boiling point and depression in freezing point.

UNIT V: Thermodynamics of Phase Changes

Definition of terms in the phase rule - derivation and application to one component systems - water and sulphur - super cooling, sublimation. two component systems - solid liquid equilibria, simple eutectic (lead-silver, Bi-Cd), desilverisation of lead - compound formation with congruent melting point (Mg-Zn) and incongruent melting point (Na-K) - solid solutions - fractional crystallization - freezing mixtures - $FeCl_3$ - H_2O systems, $CuSO_4$-H_2O system.

References:

01. B. R. Puri, L. R. Sharma, M. S. Pathania, Principles osf Physical Chemistry, (23rd edition), New Delhi, Shoban Lal, Nagin Chand & Co., (1993).

02. Maron and Prutton, Physical Chemistry, London, Mac Millan.

03. P. W. Atkins, Physical Chemistry, (5th edition) Oxford Uiversity Press. (1994).

04. G. V. Castellan, Physical Chemistry, New Delhi, Orient Longmann.

PRACTICAL III (PHYSICAL CHEMISTRY PRACTICALS) - U13CH11P

Semester : V & VI **Core Course : IX**
Instruction Hours/Week : 2+3 **Credit : 5**

List of Experiments:

01. Determination of Critical Solution Temperature of phenol-water system.
02. Effect of impurity on Critical Solution Temperature of phenol-water system.
03. Determination of Transition Temperature
04. Rast Method – Determination of K_f.
05. Rast Method – Determination of molecular weight.
06. Phase Diagram – Two-component system-Simple eutectic system
07. Kinetics – Determination of rate constant of acid catalysed hydrolysis of an ester.
08. Conductometry- Acid-Base Titration
09. Potentiometry - Redox Titration
10. Conductometry - Determination of cell constant and equivalent conductance of a strong electrolyte.

Scheme of Valuation

Maximum Marks: 75 Marks

Record	: 10 Marks
Procedure Writing	: 10 Marks
Viva-voce	: 05 Marks
Practical	: 50 Marks

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PRACTICAL IV (GRAVIMETRIC AND ORGANIC ANALYSIS) - U13CH12P

Semester : V & VI **Core Course : X**
Instruction Hours/Week : 3+3 **Credit : 5**

Gravimetric Analysis:

01. Estimation of Lead as lead chromate.
02. Estimation of Barium as barium chromate.
03. Estimation of Nickel as Nickel - DMG complex.
04. Estimation of Copper as copper (I) thiocyanate
05. Estimation of Magnesium as magnesium oxinate
06. Estimation Calcium as calcium oxalate monohydrate

07. Estimation of Barium as barium sulphate.

08. Estimation of Iron as Iron (III) oxide.

Organic Qualitative Analysis:

Analysis of Simple Organic compounds (a) characterization of functional groups (b) confirmation by preparation of solid dervatives / characteristic colour reactions. Note: Mono-functional compounds are given for analysis. Incase of bi-functional compounds, students are required to report any one of the functional groups.

Organic Preparation:

Preparation of Organic Compounds involving the following chemical conversions

1. Oxidation, 2. Reduction, 3. Hydrolysis, 4. Nitration, 5. Bromination, 6. Diazotization and 7. Osazone formation

Determination of Physical Constants:

Determination of boiling /melting points by semimicro method.

Reference:

01. V. Venkateswaran, R. Veerasamy, A. R. Kulandaivelu, Basic principles of Practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons (1997).

Scheme of Valuation

Maximum Marks: 75 Marks

Record	: 05+05=10 Marks
Viva Voce	: 05 Marks
Gravimetric	: 30 Marks

Organic Analysis and Organic Preparation: 30 Marks

Organic Preparation	: 10 Marks
Physical Constant	: 05 Marks
Aromatic/Aliphatic	: 02 Marks
Saturated/Unsaturated	: 02 Marks
Special Element	: 03 Marks
Functional Group	: 05 Marks
Derivative	: 03 Marks

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INORGANIC CHEMISTRY – II – U13CH13

Semester : VI **Core Course : XI**
Instruction Hours/Week : 6 **Credit : 6**

UNIT I: Binary and Organometallic Compounds

Binary compounds - hydrides, borides, carbides and nitrides - classification, preparation, properties and uses.Organometallic compounds of alkenes, alkynes and cyclopentadiene.

UNIT II: Some Special Classes of Compounds

Clatharates - examples and structures - interstitial compounds and non-stoichiometric compounds.Silicones - composition, raw materials, manufacture, structure, properties and uses.

Metal alkyls - coordination polymers and phosphonitrilic polymers.Silicates - classification into discrete anions- one, two, and three dimentional structures with typical examplex - composition, properties and uses of beryl, asbestos, talc,mica, zeolites and ultramarines.

UNIT III: Metallic State

Packing of atoms in metals (bcp, ccp and hcp) - theories of metallic bonding - Electron gas, Pauling and Band theories.Structure of alloys - substitutional and interstitial solid solutions - Hume-Rothey ratios - crystal defects in stoichiometric and non-stoichiometric compounds.

Semi conductors - extrinsic and intrinsic - n-type and p-type - composition, structure and uses in electronic industry

UNIT IV: Nuclear Chemistry

Introduction - composition of nucleus and nuclear forces.Nuclear stability - n/p ratio - mass defect, binding energy, packing fraction and magic numbers - nuclear shell and liquid drop models.Isotopes - detection and separation - isotopic constitution of elements - Whole number rule - Isobars, Isotones and nuclear isomers.

UNIT V: Radioactivity and Nuclear Transformations

Radioactivity - discovery, detection and measurement (Wilson Cloud Chamber) - radioactive emission - disintegration theory - modes of decay - rate of disintegration - half-life- average life - radioactive series.Nuclear transformations - use of projectiles - nuclear reactions - fission and fusion - nuclear reactor - applications of radioisotopes - carbon dating - radioactive waste disposal.Radiolysis of water and hydrated electron.

References:

01.P.L.Soni, Mohan Katyal, "Text book of Inorganic Chemistry", 20th Revised Edition (2007), Sultan Chand & Sons, New Delhi.

02. R. D. Madan, "Modern Inorganic Chemistry", 2nd Edition (2008), S. Chand and Company Ltd., New Delhi.

03. J. D. Lee, Consise Inorganic Chemistry, ELBS, 4 th edition,

04.Satyaprakash, G. D.Tuli, S. K. Basu, and R.D.Madan, Advanced Inorganic chemistry (vol I & II), S. Chand, New Delhi (2006).

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ORGANIC CHEMISTRY II – U13CH14

Semester : VI **Core Course : XII**
Instruction Hours/Week : 6 **Credit : 6**

UNIT I: Nitro Compounds and Amines

Conversion of nitro benzene to o, p and m - dinirobenzene, TNT - reduction of aromatic nitro compounds in neutral, acidic and alkaline media.Relative basic characters of aliphatic and aromatic amines ring substitution in aromatic amines - diazotization and its mechanism - synthetic applications of diazonium salts.Phenylene diamines - sulphanilic acids - sulphanilamide, saccharin, chloranine-L

UNIT II: Amino acids, Proteins and Nucleic acids

Amino acids - introduction - classification, preparation, properties and reaction of amino acids. Zwitter ion, isoelectric point. Peptides - polypeptides - synthesis and end group analysis. Proteins - classification based on physical, chemical properties and physiological functions. Primary, secondary and tertiary structures of proteinNucleic acids - nucleotides, nucleosides, heterocyclic bases and sugars. DNA and RNA, biological functions.

UNIT III: Carbohydrates

Carbohydrates - classification - preparation and reactions of glucose and fructose, structural elucidation of glucose only. Mutarotation and its mechanism, epimerization. ascending and descending of sugar series - interconversions.Disaccharides - preparation, reactions and structures of maltose, lactose and sucrose. (Structural elucidation NOT necessary).Polysaccharides - starch and cellulose. Properties, structures and uses. (Structural elucidation NOT necessary).

UNIT IV: Phenols and Dyes

Acidic character of phenols - electrophilic substitution reactions of phenols - coupling with diazonium salts, Reimer-Tiemann reaction, Houben-Hoesch acylation, Gattermann's reaction, Kolbe's reaction.Cresols, Nitro and amino phenols, di and trihydric phenols, α and β-napthols preparation and properties.Dyes - theory of color and constitution. Classification according to structure and application. Preparation and uses of the following dyes.

(i) Azodyes - methyl orange and Bismark Brown.

(ii) Triphenyl methane dyes - Malachite green.

(iii) Phthalein dyes - Phenolphthalein and flourescein

(iv) Vat dye - Indigo

(v) Anthraquinone dye - Alizarin.

UNIT V: Molecular Rearrangement and Alkaloids

Molecular Rearrangements - classification and mechanism. Pinacol-pinacolone - Beckmann rearrangement.Hoffmann - Curtius - Lossen - Schimdt, Cope and Claisen-Fries – Benzil-Benzilic acid rearrangements Alkaloids - general methods of isolation - importance - structure elucidation of coniine, piperine and nicotine.

References:

1. P.L.Soni and H.M.Chawla, 1997, Text book of Organic Chemistry, 27th edition, S.Chand and Sons.
2. K. S. Tewari and N. K. Vishnoi, 2006, A Text book of Organic Chemistry, 3rdedition,Vikas Publishing House, Pvt. Ltd.
3. M.K.Jain Organic Chemistry, 12th edition, Shoban Lal Nagin Chand and Co.

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PHYSICAL CHEMISTRY II – U13CH15

Semester : VI **Core Course : XIII**
Instruction Hours/Week : 6 **Credit : 6**

UNIT I: Electrical Conductance

Electrical transport and conductance in metal and in electrolytic solution.- specific conductance and equivalent conductance - measurement of equivalent conductance using Kohlraush's law. Arrhenius theory of electrolytic dissociation and its limitation - Arrhenius theory of strong and weak electrolytes.. Ostwald's dilution law - applications and limitation - variation of equivalent conductance with concentration, migration of ion - ionic mobility. Kohlrausch's law and its applications. The elementary treatment of the Debye-Huckel-Onsager equation for strong electrolytes - evidence for ionic atmosphere. The conductance at high fields (Wien effect) and high frequencies (Debye-Falkenhagen effect). Transport number and Hittorfs rule - determination by Hittorf's method and moving boundary method - application of conductance measurements - determination of the concentrations of strong electrolytes and acids. Determination of K_a of acids - determination of solubility product of a sparingly soluble salt - common ion effect - conductometric titrations.

UNIT II: Electrochemical Cells

Electrolytic and galvanic cells - reversible and irreversible cells - conventional representation of electrochemical cells - electromotive force of a cell and its measurement - computation of EMF - calculation of thermodynamic quantities of cell reactions (ΔG, ΔH, ΔS and K) - application of Gibbs-Helmholtz equation - concentration and EMF - Nernst equation - types of reversible electrodes - gas/metal ion - metal/metal ion; metal/insoluble salt/anion and redox electrodes - electrode reactions -

Nernst equation - derivation of cell - EMF and single electrode potential - standard hydrogen electrode - reference electrodes - standard electrode potentials - sign convention - electrochemical series and its significance - concentration cell with and without transport - liquid junction potential - application of EMF of concentration cells - valency of ion- solubility product and activity co-efficient - potentiometric titrations - determination of pH using hydrogen and quinhydrone electrodes - determination of pK_a of acids by potentiometric method.

UNIT III: Photochemistry

Consequences of light absorption - Jablonski diagram - radiative and non-radiative transitions - laws of photo chemistry - Lambert-Beer, Grothus-Draper and Stark-Einstein. quantum efficiency - photo chemical reactions - rate law - kinetics of H_2-Cl_2 and H_2-Br_2 reactions - comparison between thermal and photochemical reactions - photo sensitization and quenching - Fluorescence, phosphorescence and chemiluminescence.

UNIT IV: Spectroscopy - I

Electromagnetic spectrum - the regions of various types of spectra.

Microwave spectroscopy: Rotational spectra of diatomic molecules- treatment as rigid rotator - condition for a molecule to be active in microwave region - rotational constants (B) - and selection rules for rotational transition. Frequency of spectral lines, calculation of inter - nuclear distance in diatomic molecules.

Infrared spectroscopy: Vibrations of diatomic molecules - harmonic and anharmonic oscillators - zero point energy - dissociation energy and force constant - condition for molecule to be active in the IR region - selection rules for vibrational transition - fundamental bands - overtones and hot bands - diatomic vibrating rotator - P,Q,R branches - determination of force constant

UV visible spectroscopy: conditions - theory of electronic spectro

types of electronic transitions - Franck-Condon principle – pre-dissociation - applications.

UNIT V: Spectroscopy - II

Raman spectroscopy: Rayleigh scattering and Raman scattering - Stokes and antistokes lines in Raman spectra - Raman frequency - quantum theory of Raman effect - condition for a molecule to be Raman active - comparison of Raman and IR spectra - structural determination from Raman and IR spectroscopy - rule of mutual exclusion.

NMR spectroscopy: Nuclear spin and conditions for a molecule to give rise to NMR spectrum - theory of NMR spectra - number of NMR signals - equivalent and non-equivalent protons - position of

NMR signals - shielding, deshielding, chemical shift, ∂ and tau scales - peak area and number of protons - splitting of NMR signals - spin-spin coupling- examples of simple compounds.

References:

1 .S.H.Maron, and J.B.Lando, Fundamentals of Physical Chemistry, Macmillan.

2. B. R. Puri, L. R. Sharma, and B. K. Pathania, Principles of Physical Chemistry, Vishal publishing company.

3. S. Glasstone and D. Lewis, Elements of Physical Chemistry, Macmillan.

4. Rajaram and Kuriacose, Thermodynamics for students of chemistry.

5.Khterpal and S.C. Pradeep, Physical Chemistry, Volume I & II, Pradeep publications Jalandhur, 2004.

6.D.V.S.Jain and S.P.Jainhar, Physical Chemistry, Principles and problems, Tata McGraw Hill, New Delhi, 1988.

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FOOD CHEMISTRTY - U13CH16E

Semester : VI **Elective Course : III**
Instruction Hours/Week : 5 **Credit : 4**

UNITI: FOOD ADULTERATION

Soruces of food, types, advandagesand disadvandages Food adulteration –contamination of Wheat, Rice, Alial, Milk. Butter etc.with clay stones ,water and toxic chemicals – common adulterants .ghee adulterants and their detection – detection of adultered food by simple analytic techniques.

UNITII: FOOD POISON

Food poison –natural (alkaloids –njrphrotoxing)-pesticides (DDT,BHC ,MALATHON)- Chemical poisons –first aid for poison consumed victims

UNIT III: FOOD ADDITIVES

Food additives –artificial sweetners –saccharin –cyclomate and transparate .food flavours – esters aldehydes and heterocyclic compound food colours –nestricte use spurious colours – emuldifying agents – preservatives learning agents ,baking powder yeast laste makers –MSG vinegar.

UNIT-IV : BEVERAGES

Beverages -Soft drinks –soda –fruit juices –alcoholic beverages examples –Carbonation – addition to alcohol – cirrhosis of liver and social problems

UNIT-V : EDIBLEL OILS

Fats ,Oil –Sources of Oils –production ofrefined vegeatables oils – preservation ,saturated and unsaturated fatty acids –iodine value – role of MUFA AND PUFA in preventing heart diseases – determination of iodine value and RM value ,specifications values and their significance , Estimation of iodine and RM values in edible oils.

REFERENCES:

1. M.Swaminathan ,Food Science and Experiment foods ,ganesh and company
2. Jayashree Ghosh , Fundamental concepts of Applied chemistry ,S.Chand & co .publishers.
3. Thangamma Jacob, text Books of Applied chemistry for home science and allied science, Macmillan

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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^{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 $e^{ax} x^n dx$, $\sin^n x\,dx$, $\cos^n x\,dx$, where n is a positive integer- Evaluation of $\int_0 e^{ax} x^n dx$,

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

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. $F(p_1q)=o$, $F(x_1p_1q)=0$, $F(y_1p_1q)=0$, $F(z_1p_1q)=0$, $F_1(x_1p)=F_2(y_1q)$, $Z=p_x+q_y+f(p_1q)$.

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 ( ), 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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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 - Expansion of cos ^{n} , sin ^{n} in a series of sines and cosines of multiples of , given in radians (proof not required) and simple problems.

Unit II

Euler's formula for e^{i} . Definition of hyperbolic functions – relation between the circular and hyperbolic functions – Formula involving hyperbolic functions – Expansion of sinhx and coshx 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 (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 (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 PHYSICS – I – U13APH1

Semester : III **Second Allied Course: 1**
Instruction Hours/Week: 5 **Credit: 3**

Objectives:

To study the concepts of Properties of Matter, Sound.
To study the concepts of Surface tension and Viscosity and Thermal Physics.
To study Electromagnetic Spectrum, Raman Effect and Fiber Optic Communication.

UNIT-I: PROPERTIES OF MATTER

Stress – strain, Hooke's Law – Elastic behavior of a material – Relation between elastic constants – Work done per unit volume in longitudinal strain - Poisson Ratio - Expression for bending moment – Experimental determination of Young's modulus by Non-uniform Bending (Pin and Microscope method).

UNIT-II: SOUND

Simple Harmonic Motion – Composition of two simple harmonic motion - along a straight line and at right angles to each other – Lissajou's figures and their applications.

Acoustics of buildings- Reverberation – Reverberation time – Sabine's formula- Conditions for Good Acoustics – Law of vibration of Stretched Strings – Sonometer.

UNIT-III: SURFACE TENSION & VISCOSITY

Definition and dimension of surface tension – Variation of surface tension with temperature – Experiment to determine the surface tension of given liquid by Drop weight method

Co-efficient of Viscosity and its dimension – Poiseuille's formula – Experiment to determine the Co-Efficient of Viscosity (Poiseuilles Method).

UNIT-IV: THERMAL PHYSICS

Newton's law of cooling – Verification – Specific Heat Capacity of liquid by Cooling – Bomb Calorimeter.

Conduction- Coefficient of thermal conductivity – Good and bad Conductor. Stefan's law of radiation – Solar Constant – Angstrom's Pyroheliometer - Temperature of the Sun.

UNIT-V: OPTICS

Electromagnetic Spectrum – Spectral response of human eye – UV and IR spectroscopy – Raman Effect – Experimental Arrangement – Applications of Raman Effect.

Fiber Optic communication: Introduction – Optic Fiber – Numerical Aperature – Coherent bundle – Fiber optic communication system and its advantages – Multimode Fibre - Optic Sensors.

BOOKS FOR STUDY AND REFERENCE

1. Text book of Sound – Brij Lal and N.Subrahmanyam,Vikas Publications Pvt. Limited (2000)

2. Elements of Properties of matter – D.S.Mathur, Shyam Lal Charitable Trust, New Delhi (2005)
3. Properties of matter – R.Murugeshan. S.Chand and Co. New Delhi.(1999)
4. Heat and Thermodynamics – Brij Lal and N.Subrahmanyam-S.Chand(1999).
5. Text Book of Optics – Brij Lal and N.Subrahmanyam. S.Chand and Co. Delhi.(2010)
6. Optics – Ajoy Ghatak – Tata Mc Graw Hill, Delhi(2004)-2nd edi.
7. Modern Physics- R.Murugeshan, S.Chand and company Ltd., New Delhi (2006).
8. Allied Physics – I – A. Sundaravelusamy. Priya Publications.

Unit	Book	Section
I.	3	8.15, 8.16.
	4	1.1, 1.2, 1.4, 1.6, 1.7, 1.14, 1.15, 1.21.
II.	1	1.3, 2.1, 2.2, 2.8, 2.9, 10.14, 10.15, 10.16, 10.22, 7.4
III.	3	3.1, 3.12, 3.17, 2.1, 2.3, 2.7.
IV.	5	3.5, 3.15, 8.1, 8.2, 8.18, 8.25, 8.43, 8.44, 8.45
V.	6	11.15, 11.14, 11.13.
	8	19.11, 19.12, 19.13, 19.14.
	7	24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.10, 24.11, 24.11.1.

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ALLIED PHYSICS PRACTICAL – U13APH2P

Semester : III & IV **Second Allied Course: II**
Instruction Hours/Week:2+3 **Credit: 3**

(At the end of the Even Semester-Any twelve expts.)

1. Non-Uniform Bending – Pin and Microscope method.
2. Sonometer – Verification of laws of transverse vibrations.
3. Specific heat capacity of a liquid – Newton's law of cooling method.
4. Thermal conductivity of a bad conductor – Lee's disc method.
5. Meter Bridge – Specific Resistance of a material of a coil.
6. Carey Foster Bridge- Specific Resistance of a material of a coil.
7. Newton's Rings –determination of Radius of Curvature(R).
8. Spectrometer – Refractive Index of a (μ) of solid prism.
9. Spectrometer- Determination of wavelength using Grating.
10. Air wedge – thickness of insulation of a wire.
11. Characteristics of a Junction Diode.
12. Co-efficient of Viscosity a liquid- Poiseuille's method.
13. Surface Tension and Interfacial Tension of a liquid-Drop Weight method.
14. Construction of Full Wave Rectifier.

15. Study of Logic Gates-using ICs.
16. Figure of Merit-B.G.

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ALLIED PHYSICS – II – U13APH3

Semester : IV **Second Allied Course: III**

Instruction Hours/Week: 5 **Credit: 3**

Objectives:

To study Gauss law and its applications and also the principle and types of Condensers.
To study Kirchhoff's laws, Wheatstones Bridge and their applications.
To learn atomic and nuclear physics.
To acquire knowledge about modulation and digital electronics.

UNIT –I: ELECTROSTATICS

Coulomb's Law- Gauss law and its applications- Intensity at a point due to charged sphere and cylinder- Principle of capacitor- capacity of the spherical- cylindrical condenser -Energy of a charged capacitor- sharing of charges and loss of energy.

UNIT -II: ELECTRICITY

Kirchoff's law- Applications- Wheatstone Bridge- Carey Foster's Bridge-Laws of Electromagnetic induction- Expression for induced E.M.F- Self inductance- Determination of coefficient of self inductance – Rayleigh's method-Mutual inductance of solenoid- Experimental determination of mutual inductance.

UNIT- III: ATOMIC PHYSICS:

Sommerfield, Vector Atom models-quantum numbers in vector atom model- Pauli's exclusion principle - Continuous and characteristic X-Rays-Moseley's law and its importance- Bragg's law-Miller indices- Determination of crystal structure-powder crystal method.

UNIT –IV: NUCLEAR PHYSICS

Nuclear Size-charge – mass- spin- nuclear models- liquid drop model- shell model – Particle detectors- cloud chamber-bubble chamber- photographic emulsion technique-Elementary particles (fundamental ideas only).

UNIT- V: ELECTRONICS AND DIGITAL ELECTRONICS

Modulation- necessity of modulation-Methods of modulation- Amplitude Modulation- junction diode detector for AM signal.

Number systems –Decimal, Binary, Octal, Hexadecimal and their mutual conversions-binary arithmetic operations. Basic logic gates- AND, OR, NOT, NOR NAND – NOR and NAND gate as universal gates. Laws of Boolean Algebra- De Morgan's theorems.

BOOKS FOR STUDY AND REFERENCE

1. Text book of Electricity and Magnetism- Brij Lal and N.Subrahmanyam, Ratan prakasan Mandir Publisher London. (1997).
2. Modern Physics-Murugesan, S.Chand & Co - New Delhi (2010).
3. Basic Electronics- B.L. Theraja , S.Chand & Co - New .Delhi(2008)

Unit	Book	Section
I	1	6.1-6.3, 7.1-7.4
II	1	13.21, 13.22, 13.32, 18.1,18.6, 18.9, 18.11, 18.13, 18.15
III	2	6.11-6.15, 7.11-7.13, 7.6, 7.3, 7.8
IV	2	27.3, 27.10, 27.11, 29.7, 29.9, 29.11, 38.1,
V	3	30.5, 30.8, 30.9, 30.30, 32.2-32.4, 32.7, 32.19, 32.28, 32.9-32.11, 33.3, 33.10, 33.15, 33.19-33.22, 34.3, 34.5

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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 resoureces 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-sports 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 arid control measures of urban and industrial wastes.

• Role of an individual in prevention of pollution.

• Pollution case studies.

• Diaster 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 rahabilitation 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, Clanderson Press Oxford (TB)

e) Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 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)

j) Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.

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)

0) 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 Stadards, 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 Detertninism- Patriarchy- Fcminism -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 Xl 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 - Polities Law Domestic Violence — Sexual Harassment — State Policies and Planning

Unit-IV

Women Development and Gender Empowerment: Initiatives International Women's Dcca4e - 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 ofSexual 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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