

# **B.Sc. Chemistry**

## *Syllabus*

*(With effect from the year 2018-2019)*



**Department of Chemistry**  
**Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya**  
(University established under sec 3 of UGC Act 1956)  
(Accredited with "A" by NAAC)  
Enathur, Kanchipuram – 631 561.Tamilnadu,

**B. Sc [Chemistry] – CURRICULUM (with effect from 2018-2019)**

Sem	Part	Subject type	Subject Code	Title of the paper	Credit	IA	EA	Tot
I	I	Language	BCHF181TT0	Tamil – I	3	40	60	100
			BCHF181TS0	Sanskrit-I	3	40	60	100
			BCHF181TH0	Hindi-I	3	40	60	100
	II	English	BCHF181T20	English-I	3	40	60	100
	III	Core paper -1	BCHF181T30	General Chemistry – I	5	40	60	100
	III	Non- major paper -1	BCHF181T40	Principles of Environmental Science	4	40	60	100
	III	Allied Paper-1	BCHF181T50	Applied Physics -I	3	30	45	75
	III	Major Practical*	BCHF181P60	Major Practical – I- Volumetric analysis	-	-	-	-
III	Allied Practical	BCHF181P70	Allied Physics Laboratory	-	-	-	-	
IV	Foundation Course-I	BCHF181T80	Functional English	1	100	-	100	
					<b>19</b>			
II	I	Language	BCHF182TT0	Tamil – II	3	40	60	100
			BCHF182TS0	Sanskrit-II	3	40	60	100
			BCHF182TH0	Hindi-II	3	40	60	100
	II	English	BCHF182T20	English-II	3	40	60	100
	III	Core paper- 2	BCHF182T30	General Chemistry - II	5	40	60	100
	III	Non-major paper-2	BCHF182T50	Programming in C	4	40	60	100
	III	Allied Paper-2	BCHF182T40	Applied Physics -II	3	30	45	75
	III	Major Practical	BCHF182P70	Major Practical – I- Volumetric analysis	5	40	60	100
III	Allied Practical	BCHF182P80	Allied Physics Laboratory	2	20	30	50	
IV	Foundation Course-II	BCHF182T60	Indian Culture	1	100	-	100	
					<b>26</b>			
III	I	Language	BCHF183TT0	Tamil – III	3	40	60	100
			BCHF183TS0	Sanskrit-III	3	40	60	100
			BCHF183TH0	Hindi-III	3	40	60	100
	II	English	BCHF183T20	English-III	3	40	60	100
	III	Core paper-3	BCHF183T30	Analytical Chemistry	5	40	60	100
	III	Allied Paper-3	BCHF183T4A	Allied Mathematics-I	4	40	60	100
			BCHF183T4B	Allied Computer Science-I	3	30	45	75
	III	Major Practical*	BCHF183P60	Major practical – II- Qualitative Inorganic analysis	-	-	-	-
III	Allied Practical	BCHF183P70	Allied Computer Science Laboratory	-	-	-	-	
IV	Open Elective **			1	100	-	100	
IV	Skill Based Elective-I	BCHF183T50	Chemistry in everyday life	1	100	-	100	
					<b>17/16</b>			
IV	I	Language	BCHF184TT0	Tamil – IV	3	40	60	100
			BCHF184TS0	Sanskrit-IV	3	40	60	100
			BCHF184TH0	Hindi-IV	3	40	60	100
	II	English	BCHF184T20	English-IV	3	40	60	100
	III	Core paper-4	BCHF184T30	Spectroscopic methods of analysis	5	40	60	100
	III	Allied Paper-4	BCHF184T40	Allied Mathematics-II	4	40	60	100
			BCHF184T50	Allied Computer Science-II	3	30	45	75
	III	Major Practical	BCHF184P60	Major practical – II- Qualitative Inorganic analysis	5	40	60	100
III	Allied Practical	BCHF184P70	Allied Computer Science Laboratory	2	20	30	50	
IV	Skill Based Elective – II	BCHF184E80	Water analysis and treatment	1	100	-	100	
					<b>21/22</b>			
V	III	Core paper-5	BCHF185T10	Inorganic Chemistry – I	5	40	60	100
	III	Core paper-6	BCHF185T20	Organic Chemistry – I	5	40	60	100
	III	Core paper-7	BCHF185T30	Physical Chemistry – I	5	40	60	100
	III	Major Practical	BCHF185P40	Major practical – III Gravimetric analysis	5	40	60	100
	III	Major Practical	BCHF185P50	Major practical – IV Organic analysis	5	40	60	100
	IV	Skill based Elective - III	BCHF185SE1	Chemical Industries- principles and practices	1	100	-	100
					<b>26</b>			
VI	III	Core paper-8	BCHF186T10	Inorganic Chemistry – II	5	40	60	100
	III	Core paper-9	BCHF186T20	Organic Chemistry – II	5	40	60	100
	III	Core paper - 10	BCHF186T30	Physical Chemistry – II	5	40	60	100
	III	Major lab	BCHF186P40	Major practical- V -Physical Chemistry lab	5	40	60	100
	III	Major Project	BCHF186Z50	Project	10	-	100	100
	IV	Skill Based Elective -IV	BCHF186T60	Pharmaceutical Chemistry	1	100	-	100
					<b>31</b>			
					<b>Total</b>	<b>140</b>		

\* Continued for next semester.

\*\*\*Any one to be selected by the student. \*\*The student will select one non-core elective paper offered by the university.  
This course will facilitate the student to learn a topic of interest other than core subject.

## Semester-I

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
I	I	BCHF181TT0	Tamil -I	3	-	1	3

**நோக்கம் :** எளிமையான மொழி ஆக்கங்களை அறிந்து கொள்ளும் வகையில் மக்கள் இலக்கியமான நாட்டுப்புற இலக்கிய வகையிலிருந்து சிலவும், உரைநடையின் எளிய வடிவமான சிறுகதைகள் சிலவற்றை அறிமுகம் செய்துவைக்கும் நோக்கில் சிலவும், கவிதை வடிவம் பற்றி உரை பாரதியார் தொடங்கி தற்காலப் புதுக்கவிஞர்கள் சிலரின் படைப்புகளும் தரப்பட்டுள்ளன. அடிப்படை மொழிப்பயிற்சி தரப்பட்டுள்ளது.

**பயன் :** வாழ்க்கையின் அனுபவங்களின், உணர்வுகளின் 'இயல்பான வெளிப்பாடு கலை' என்பதை உணர்தல்; நல்ல, உயர்வான படைப்பாளிகளை அறிந்துகொள்ளுதல்; இலக்கியத் தேடல் ஆர்வத்தைத் தூண்டுதல்.

அலகு – 1

(12 Hrs)

தமிழ் இலக்கிய வரலாறு

1. நாட்டுப்புற இலக்கிய வரலாறு  
நாட்டுப்புறப் பாடல்கள், நாட்டுப்புறக் கதைகள்,  
நாட்டுப்புறக் கதைப் பாடல்கள், பழமொழிகள்,  
விடுகதைகள்

2. உரைநடை இலக்கிய வரலாறு  
சிறுகதைகள் தோற்றமும் வளர்ச்சியும்

3. கவிதை இலக்கிய வரலாறு  
புதுக் கவிதைகள் தோற்றமும் வளர்ச்சியும்

அலகு – 2

(12 Hrs)

1. வாய்மொழி இலக்கியம் நாட்டுப்புறப் பாடல்கள்  
தாலாட்டு, காதல், ஒப்பாரி

2. புதுமைப்பித்தன் சிறுகதைகள்  
கடவுளும் கந்தசாமிப் பிள்ளையும் , செல்லம்மா  
துன்பக்கேணி, ஆற்றங்கரைப் பிள்ளையார், பொன்னகரம்

அலகு – 3

(12 Hrs)

1. பாரதியார்  
காணி நிலம் வேண்டும், நல்லதோர் வீணை

2. பாரதிதாசன்  
தமிழ்க் காதல், தமிழ் வளர்ச்சி, எந்நாளோ?

3. கவிமணி தேசிய விநாயகம் பிள்ளை  
ஆறு தன் வரலாறு கூறுதல்

அலகு – 3

(12 Hrs)

1. ந. பிச்சமூர்த்தி – வழித்துணை

2. சிற்பி – முள்... முள்... முள்...

3. அப்துல் ரகுமான் – குருடர்களின் யானை

மொழிப் பயிற்சி

1. பொருத்திய சொல் தருதல்
2. மரபுத் தொடர்கள்

**பார்வை நூல்கள் :**

1. புதுமைப்பித்தன் சிறுகதைகள், பாரி புத்தகப் பண்ணை, 184, பிராட்வே, சென்னை–108.
2. தமிழக நாட்டுப்புற பாடல்கள், முனைவர். சண்முக சுந்தரம், பூம்புகார் பிரசுரம், சென்னை.
3. புதுக்கவிதை – ஒரு புதுப்பார்வை, பாலா, அன்னம் பதிப்பகம், புதுக்கோட்டை.
4. பாரதியார் கவிதைகள், மாணிக்கவாசகர் நூலகம், சிதம்பரம்.
5. மொழித்திறன் – பூவண்ணன், வர்த்தமானன் பதிப்பகம், தி.நகர், சென்னை.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
I	I	BCHF181TS0	Sanskrit - I	3	-	1	3

**Aim:**

- To understand the value of Sanskrit.

**Objective**

- To make the students comfortable and to have an idea about vowel, consonants and their combination along with their words formation, understanding the uses of nouns and verbs in the field of Sanskrit.

**Outcome**

- To realize the unit features of the Sanskrit language
- To throw a light to understand the cultural heritage of India through the language of Sanskrit.

**Unit - I भाग: – क**

(12 Hrs)

- Vowels & Consonants
- Words begin with vowels
- Words begin with क to ण
- Words begin with त to ह

**Unit - II भाग: – ख**

(12 Hrs)

- Words begin with क to झ with the combination of Vowels.
- Words begin with ट to न with the combination of Vowels.
- Words begin with प to ह with the combination of Vowels.
- Combined Letters.
- Simple Sentences.

**Unit - III भाग: – ग**

(12 Hrs)

Lessons from text book 1-6.

**Unit - IV भाग: – घ**

(12 Hrs)

Lessons from text book 7-12.

**Unit - V भाग: – ङ**

(12 Hrs)

**1.शब्दरूपाणि**

1. देवः
2. मुनिः
3. गुरुः
4. पितृ
5. गो
6. छात्रा
7. मतिः
8. गौरी
9. धेनुः
10. मातृ
11. वनम्
12. अस्मद्
13. युष्मद्
14. तद्
15. एतद्
16. इदम्
17. किम्

**2. धातुरूपाणि (Present tense, Past tense and Future tense) परस्मैपद-आत्मनेपदधातवः**

1. भू धातुः
2. पठ् धातुः
3. गम् धातुः

**Text Books -**

1. Samskrita Siksha - Part I & II Published by Department of Sanskrit and Indian culture, SCSVMV University (Deemed University), Enathur, Kanchipuram.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
I	I	BCHF181TH0	Hindi –I	3	-	1	3

**Aim:**

- To introduce the students to Hindi language and its correct form and to attract them towards. The beauty of Hindi.

**Objective:**

- To develop communication skills and writing skills in Hindi for the students belong to Non- Hindi speaking areas.
- To create opportunities to the students to enter into job filed of Central Govt. Offices through Hindi.

**Outcome:**

- Have good communication skills
- Have writing and reading skills
- Deal with the situations where they need in switch on to different languages.
- To avail opportunities in job field.

**Unit –I**

(12 Hrs)

**INTRODUCTION TO HINDI SCRIPT AND SPELLINGS:**

- Vowels
- Consonants
- Often wrong spelt words- corrections

**Unit – II**

(12 Hrs)

**BASICS OF HINDI VOCABULORY**

- Greeting words and introductory words
- Words for daily usage and spoken purpose
- Names, Counting of Numbers, colors, Vegetables, Flowers, Fruits and time calculation

**Unit – III**

(12 Hrs)

**INTRODUCTION TO HINDI GRAMMAR**

- Parts of speech
- Gender
- Number
- Synonyms
- Antonyms

**Unit – IV**

(12 Hrs)

**INTRODUCTION TO HINDI LANGUAGE WRITING**

- Application of case-endings (karak)
- Sentence formation
- Changing the sentence according to the direction

**Unit – V**

(12 Hrs)

- Usage of Tenses
- Change of Tenses
- Writing the sentence with the help of verbs
- Transcription of paragraph
- spoken Hindi practice

**Text Book**

- Material prepared by Department of Hindi, SCSVMV.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
I	II	BCHF181T20	English –I	3	-	1	3

**Aim:**

- To develop the vocabulary of the students by introducing literary pieces. This is in conformity with the dictum that language is and can be through literature.

**Objective**

- To cultivate values to face challenges in life
- To broaden the vocabulary to develop the language
- To interpret and appreciate Literature
- To learn the basic of Grammar.

**Outcome:**

The students are expected to be held to

- Appreciate Literature
- Attain enhanced vocabulary
- Basics of English Grammar
- Attain ethical and moral values in life

**Unit I: Characters from Ramayana**

(12 Hrs)

1. Sri Rama
2. Sita Devi
3. Lakshmana

**Unit II: Characters from Ramayana**

(12 Hrs)

4. Bharata
5. Dasaratha
6. Tolerance

**Unit III: Vocabulary from the Essays**

(12 Hrs)

**Unit IV: Basic Grammar**

(12 Hrs)

1. Articles
2. Pronouns –Personal & Impersonal
3. Adjectives
4. Synonyms & Antonyms
5. Sentence Structure

**Unit V: Communication through Grammar**

(12 Hrs)

6. Tense forms
7. Idioms & Phrases
8. Suitability & Verbs
9. E-Mail
10. Patterns of Greeting

**Book prescribed:**

Sivananda, Sri Swami. *Essence of Ramayana*. Rikhikesh: The Sivananda Publication League, 1943



Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
I	III	BCHF181T30	General Chemistry – I	4	0	1	5

*Aim: To study the basics of chemistry*

### **Objectives**

- To learn the basics of atomic structure, chemical bonding and periodic classification of elements.
- To understand the chemistry of Benzene and Benzenoid compounds.
- To understand the properties of gaseous molecules.

### **Outcome**

- The students are expected to gain knowledge about periodic table, quantum chemistry and aromatic compounds.

### **Unit I: Electron occupancy and periodic properties (15 hrs)**

Electron Occupancy Quantum numbers - Principal, azimuthal, magnetic and spin Quantum numbers - their significance-Principles governing the occupancy of electrons- Aufbau Principle- Hund's rule -Pauli's exclusion principle, (n+1) rule, stability of half-filled and fully filled orbitals-Classification as s, p, d & f block elements, variation of atomic volume, atomic and ionic radii, ionisation potential, electron affinity and electro negativity along periods and groups – Variation of metallic characters - Factors influencing the periodic properties.

### **Unit II: Chemical Bonding (15 hrs)**

**Ionic bond** - Lattice Energy - Born - Haber Cycle - Pauling and Muliken's Scales of electro negativity - Polarizing power and Polarisability - partial ionic character from electro negativity - Transitions from ionic to covalent character and vice versa - Fajan's rule. Theories of Bonding- Shapes of simple inorganic molecules based on VSEPR theory (BeCl<sub>2</sub>, SiCl<sub>4</sub>, PCl<sub>5</sub>, SF<sub>6</sub>, IF<sub>7</sub>, NH<sub>3</sub>, XeF<sub>6</sub>, BF<sub>3</sub>, H<sub>2</sub>O ) - VB Theory - Principles of hybridization - structure of BeCl<sub>2</sub>, NH<sub>3</sub>, H<sub>2</sub>O – Basics of MO Theory -Bonding and antibonding orbitals - Application of MO Theory to H<sub>2</sub>, He<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, HF and CO - Comparison of VB and MO Theories -H - bonding-types.

### **Unit III: Covalent bonding and Structure (15 hrs)**

**Covalent Bonding:** Catenation- Concept of Hybridization-Types of hybridization & Structures-VBT and MOT concepts.

**Electronic Effects:** Inductive, mesomeric, electromeric, resonance and hyperconjugative effects. Steric effect. Effect on the properties and reactivities of organic compounds.

**Reactive Intermediates:** Structure and Stability-Types of organic reactions - General concept of reactions. Substrate-Intermediate-TS energy profile diagram (Basic treatment) - Nomenclature of organic compounds.

### **Unit IV: Chemistry of Benzene and other benzenoid compounds (15 hrs)**

General methods of preparation of benzene – Chemical properties – Uses – Electrophillic substitution mechanism – Orientation and reactivity in substituted benzenes. Types of Polynuclear Aromatic compounds – Chemistry of Naphthalene, Anthracene, Phenanthrene and their uses.

**Unit V: Gaseous state****(15 hrs)**

Maxwell's distribution of Molecular velocities (Derivation not required). Types of Molecular velocities – Mean, Most probable and root mean square velocities. Graphical representation and its significance – Collision diameter, Mean free path and collision number – Transport properties – Thermal conductivity, Viscosity and Diffusion – Law of equipartition of energies – Degree of freedom. Molecular basis of Heat capacity – Real gases – van der Waal's equation of states – derivation – significance of critical constants – Virial equations of state – Law of corresponding states – Compressibility factor.

**Text Books:**

1. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co., (1993)
2. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (1997)
3. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co., (1993)

**Reference Books:**

1. Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006)
2. Glasstone S., Lewis D., Elements of Physical Chemistry, London, Mac Millan & Co. Ltd. (1976)
3. Morrison R.T. and Boyd R.N., Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (1976)
4. Frank J. Welcher and Richard B. Hahn, Semi micro Qualitative Analysis, New Delhi, Affiliated East-west Press pvt.Ltd.(1969)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
I	III	BCHF181T40	Principles of Environmental Science	3	-	1	4

**Aim:**

- To understand about our environment.

**Objectives:**

- To familiarize the students with basic concepts of environment and creating awareness.
- To understand their role and responsibility of an individual in the environmental conservation.

**Outcome:**

- Students are expected to be aware about the environment and pollution problems.

**Unit - 1: Introduction to environment and environmental studies (12 Hrs)**

Introduction to environment – components – nature of environment - need of awareness – water crisis - climatic change - fossil fuels– pollution – loss of biodiversity – deforestation – their impacts - reasons for environmental problems – anthropocentric and eco centric views.

Environmental studies - multidisciplinary nature – scope and aim – sustainable development- principles – RRR concept- extension – response of world community – Indian environmental movements – environmental calendar.

**Unit – 2: Ecosystem and Biodiversity (12 Hrs)**

Ecosystem – structure – functions – simplified ecosystem models (food chain and food webs and their types) - forest – grassland – pond – desert- estuary ecosystems – ecological succession - ecological pyramids – Bio-geochemical cycles of water – oxygen-carbon-phosphorous and sulphur.

Biodiversity – definition – types – species – genetic and ecosystem diversities- values of biodiversity – threats to biodiversity – conservation of biodiversity – endemism – biodiversity hotspots – Indian biodiversity – soils of India – floristic regions – endemic species of India – IUCN lists -red-green and blue data books.

**Unit – 3: Natural resources (12 Hrs)**

Natural resources – definition – types – forest resources – uses –deforestation- reasons - effects – water resources – distribution of water in the globe – other reasons for problems – conservation of water – dams – effects of dams - food resources – modern agriculture– ill effects -energy resources- types – hydel – nuclear – solar –wind and biomass energy - world scenario – Indian scenario

Population and environment – reasons for over exploitation of resources – population – demography – population curves – population explosion – effects – consumerism – effects – urbanization – reasons and effects- role of an individual.

**Unit – 4: Environmental Pollution (12 Hrs)**

Pollution – definition – types – air pollution – causes and effects – effects of CO<sub>2</sub> – CO – NO<sub>x</sub> – SO<sub>x</sub> – particulates – control of air pollution – water pollution – causes – effects – remedies – soil pollution – solid waste management – e waste – ill effects of e-waste – proper recycling- Noise pollution – reasons – effects – control – nuclear pollution – cases – effects and control – marine and thermal pollution causes – effects and remedies

Legal provisions for protecting environment – article 48 A – 51 A (g) – Environment act 1986 – Air act 1981 – Water act 1974 – wild life protection act – Forest act 1980- salient features and inadequacies - problems in implementation – reasons.

### **Unit – 5 : Social issues and environmental ethics**

(12 Hrs)

Present environmental scenario – green house effect – climate change – The Kyoto Protocol – ozone layer depletion-The Montreal Protocol - acid rain – causes – effects - disparity among the nations – The Copenhagen UNFCCC summit – carbon currency- virtual water- genetically modified organisms.

Environmental ethics – introduction – people getting affected - resettlement and rehabilitation – issues involved — Sardhar Sarovar project – Tawa Matsya sang - Melting icebergs of Arctic.

#### **Text Book**

1. Perspectives in Environmental studies – Anubha kaushik and CP kaushik, New age international publishers, 4<sup>th</sup> edition, 2014.

#### **Reference books**

1. Environmental Studies, N. Nandini, N. Sunitha and Sucharita Tandon, Sapna Book House, 2007.
2. Text book of Environmental Science, Ragavan Nambiar, Scitech Publications, 2009.
3. Text book of Environmental Chemistry and Pollution Control, S.S.Dara, S.Chand and Co., 2002.
4. Environmental Chemistry, Colin Baird, W.H.Freeman and company, New York, 1999.
5. Environmental Chemistry, Gary W. Van Loon and Stephen J. Duffy, Oxford University Press, 2000.
6. New Trends in Green Chemistry, V.K. Ahluwalia and M. Kidwai, Anamaya Publishers, 2006.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
I	III	BCHF181T50	Applied Physics-I	3	-	1	3

**Aim:**

- To make students to get familiar with broad modules of Physics such as Elastic property, Optical fibers and ultrasonic waves.

**Objectives:**

- To impart knowledge to the students in the following areas;
- Elastic property, elastic behaviour of materials under strained conditions and various factors that affect elastic property.
- Various factors that affect acoustics of a building and principles of good acoustical designing of auditoriums.
- Production and application of Ultrasonic waves.
- Principle of laser emission, various lasers – designing and applications.
- Optical fibers, principle of light transmission and types of fibers, Zener diode, FET and JFET.

**Outcome:**

- At the end of the course, the student might have acquired knowledge in the following topics;
- Elastic nature of materials and their behaviour under stress along with factors that tend to decrease the elastic property.
- Requirement of good acoustics in building, remedies to be carried out against various factors that affect acoustics of a building and designing of auditoriums with good acoustics. Generations of Ultrasonic waves and applications.
- Principle of laser emission, various lasers – designing and applications. Optical fibers, principle of light transmission and types of fibers, Zener diode, FET and JFET.

**Unit I – Properties Of Matter**

Elasticity - Stress – Strain – Hooke's law –Moduli of elasticity- Poisson's ratio- Elastic Behaviour of Material – Factors affecting Elasticity – Young's modulus by cantilever-Non - uniform Bending.

**Unit II – Technical Acoustics**

Reverberation time - Acoustics of buildings – Reverberation, echo, creep, focusing, standing wave, Principles to be observed in the Acoustical design of an Auditorium – Noise Pollution – Absorption coefficient - Ultrasonics -Generation – Piezoelectric method – Applications of Ultrasonics in industries.

**Unit III – Laser**

Principles – Einstein theory of spontaneous and stimulated emission – Population inversion - Nd:YAG laser , Co<sub>2</sub> laser – Applications of Lasers in 3D profiling, computer peripherals such as CD-ROM.

**UNIT IV Fiber Optics**

Types of Optical Fibers – step index – graded index single mode – multiple mode fiber – acceptance angle – Numerical aperture – applications in engineering and medicine.

### **UNIT V Electronics**

P-N Junction and P-N Junction Diode - Zener Diode – V-I Characteristics –Zener diode as Peak Clipper- Field Effect Transistors (FET) –Types – Junction Field Effect Transistor (JFET)– Static and Transfer Characteristics.

#### **Text Books**

1. Applied Physics for Engineers – Venkatramanan, Raja, Sundarajan –SCITECH Publishers – 2011.
2. Applied Engineering Physics – Rajendran&Marikani – Tata McGraw Hill Publications -
3. Modern Engineering Physics – R.K.Gaur&S.L.Gupta – DhanpatRai Publications -2011.
4. Modern Engineering Physics – A.S.Vasudeva – S.Chand& Company Ltd 1999.
5. Engineering Physics – Bhattacharya, Bhaskaran – Oxford Publications 2010.
6. Engineering Physics – B.N.Shankar& S.O.Pillai – New Age International Publishers.
7. Basic Electronics (Solid State) – B.L Thereja 2007.

#### **Reference Books**

1. Properties of Matter - D.S.Mathur. (Unit I) – 2008.
2. Sound - Brijilal& Subramanian. (Unit II) – 1985.
3. Engineering Physics - Rubhan Kumar. (Unit II & III)
4. Engineering Physics - M.N.Avadhanulu. (Unit II &III) – 1992.
5. Fiber Optics - R.Agarwal. (Unit IV)
6. Basic Electronics (Solid State) – B.L Thereja (Unit V) – 2007.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
I	IV	BCHF181T80	Functional English	1	-	-	1

**Aim:**

- Aims to promote graduates into employees.

**Objective:**

- To help students to develop their communication skills.

**Outcome:**

The students are expected to be able to

- Speak fluently in the classroom
- Listen and communicate efficiently

**Unit I**

(5 Hrs)

**Interpersonal Communication:**

- At the Post –Office
- At the Doctor's
- At the Market
- At the Railway Station
- At the Bank

**Unit II**

(5 Hrs)

**Speaking Skills:**

- Introducing oneself and others
- Giving Instructions
- Making Requests and Responding to Requests
- Apologising and Responding to an Apology
- Paying Compliments, Showing Appreciation and offering Encouragement

**Unit III**

(5 Hrs)

**Speaking Skills:**

- Asking for and Giving an Opinion
- Expressing Likes, Dislikes, Hopes, Wishes, Regrets
- Expressing Sympathy, Emotions and offering Condolences
- Expressing Possibility, Impossibility, Probability and Improbability
- Expressing Ability and Inability, Obligation and Necessity

**Reference Books :**

1. Spoken English – Namrata Palta, 2<sup>nd</sup> edition, Tata Mcgraw –Hills, 2008.
2. Spoken English – Sasikumar and Dhamija
3. Conquest of Communication Vol. I & II – Dr T.M.Farhathullah

## Semester II

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	I	BCHF182TT0	Tamil -II	3	-	1	3

## நோக்கம்

தமிழில் பிரபந்தங்கள் எனப்படும் சிற்றிலக்கியங்கள் பற்றிய செய்திகளையும், சிறப்புகளையும் அறிய வகைமை மட்டும் காட்டப்பட்டுள்ளன. சமய இலக்கிய வகையில் கிருத்துவர்களின் தமிழ்த்தொண்டு குறிப்பிடப்பட்டுள்ளது. குறிப்புகள் அறியும் வகையில் இலக்கணம்; மொழிப்பயிற்சி காட்டப்பட்டுள்ளது.

**பயன்:** இலக்கிய வளம் மிகுந்த மொழி 'தமிழ்' என்பதை உணர்தல்; நூறு வகைக்கும் மேற்பட்ட சிற்றிலக்கியங்கள் தமிழில் உள்ளன என்பதறிந்து தமிழின் ஆழ, அகலம் உணர்தல்; சமயங்கள் வளர்த்த தமிழ் பற்றி அறிதல் மொழி இலக்கணத்தின் தொடக்க நிலை பற்றி புரிந்துகொள்ளல்.

அலகு – 1

(12 hrs)

தமிழ் இலக்கிய வரலாறு ஹ

1. கிருத்துவ இலக்கிய வரலாறு

2. காப்பிய இலக்கிய வரலாறு

அலகு – 2

(12 hrs)

1. நந்திக் கலம்பகம்

2. முத்தொள்ளாயிரம்

3. தமிழ் விடு தூது

அலகு – 3

(12 hrs)

1. திருக்குற்றாலக் குறவஞ்சி (குறத்தி மலைவளம் கூறுதல்)

2. முக்கூடல் பள்ளு (நாட்டு வளம்)

3. இயேசு பிரான் பிள்ளைத் தமிழ் (செங்கீரைப் பருவம் முதல் 5 செய்யுள்கள்)

அலகு – 4

(12 hrs)

1. நளவெண்பா (கலி நீங்கு காண்டம்)

அலகு – 5

(12 hrs)

மொழிப் பயிற்சிஹ

1. இலக்கண குறிப்புகள்ஹ

பண்புத்தொகை, வினைத்தொகை,

உம்மைத் தொகை, அன்மொழித் தொகை,

இருபெயரொட்டுப் பண்புத்தொகை

2. ஒரு பொருள் குறித்த பல சொற்கள்

3. பல பொருள் குறித்த ஒரு சொல்

4. அகர வரிசைப்படுத்துதல்

## பார்வை நூல்கள்:

1. தமிழிலக்கிய வரலாறு – முனைவர். மு.வ., பாரி நிலையம், சென்னை.
2. தமிழிலக்கிய வரலாறு – ஜெ. ஸ்ரீசந்திரன், தமிழ் நிலையம், சென்னை.
3. தமிழ் சிற்றிலக்கியங்கள் – நா. வீ. செயராமன்.



Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	I	BCHF182TS0	Sanskrit - II	3	-	1	3

**Aim:**

- To understand the value of Sanskrit.

**Objective:**

- The course is prepared with the collection of subhasistas from ancient text which gives a brief knowledge about the nature of human being in connection to the culture and tradition of India. The Objective of the course is to give a chance to the student to get the moral values as reflected in ancient texts.

**Outcome**

- To realize the unit features of the Sanskrit language
- To throw a light to understand the cultural heritage of India through the language of Sanskrit.

**Unit - I भाग: – क (12 hrs)**

Poetry: सुभाषितमाला I - 1 to 6 Slokas

Prose: Lessons 1 to 3 (From Sanskrit Pravesika)

**Unit - II भाग: – ख (12 hrs)**

Poetry: सुभाषितमाला II - 1 to 8 Slokas

Prose: Lessons 4 to 6 (From Sanskrit Pravesika)

**Unit - III भाग: – ग (12 hrs)****Grammar:**

1. अच्सन्धि:

2. हल्सन्धि:

**Unit - IV भाग: – घ (12 hrs)****Essays :**

1. अस्माकं देश:

2. दीपावली महोत्सव:

3. संस्कृतप्रचारस्य आवश्यकता

**Unit - V भाग: – ङ (12 hrs)****Slokas (Verses) :**

1. Sowndaryalahari (10 Slokas)

**Text books**

- Subhashitamala, Prepared by Dept. of Sanskrit and Indian Culture, SCSVMV University.
- Sowndaryalahari

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	I	BCHF182TH0	Hindi -II	3	-	1	3

**Aim:**

- To introduce the students to Hindi language and its correct form and to attract them towards. The beauty of Hindi.

**Objective:**

- To develop communication skills and writing skills in Hindi for the students belong to Non- Hindi speaking areas.
- To create opportunities to the students to enter into job filed of Central Govt. Offices through Hindi.

**Outcome:**

- Have good communication skills
- Have writing and reading skills
- Deal with the situations where they need in switch on to different languages.
- To avail opportunities in job field.

**Unit –I**

(12 hrs)

## PARAGRAPH AND PRECISE WRITING IN HINDI:

- Comprehensive paragraph
- Paragraph Writing
- Simple translation of sentences

**Unit – II**

(12 hrs)

## HINDI LITERATURE – OLD POETRY

- Tulasi Das
- Rahim

**Unit – III**

(12 hrs)

## HINDI LITERATURE – MODERN POETRY

- Himadri se
- Bharat Mata

**Unit – IV**

(12 hrs)

## HINDI LITERATURE- PROSE

- Smriti

**Unit – V**

(12 hrs)

## HINDI LITERATURE- PROSE

- Sanyasi

**Text Books:**

- 'SARAL HINDI SIKSHA' -1 (Prepared by Department of Hindi, SCSVMV)
- 'HINDI SAHITYA SUDHA' (Edited by Department of Hindi, SCSVMV)

**Reference Book**

- Saral Hindi Vyakanam- S.C. Kapoor (2009)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	II	BCHF182T20	English -II	3	-	1	3

**Aim:**

- To develop the communication skills of the students through literature.

**Objective**

- To develop interest to appreciate literature
- To strengthen the aesthetic sense
- To inculcate moral values through stories
- To enrich vocabulary

**Outcome:**

The students are expected to be able to

- Appreciate Literature
- Developed aesthetic sense
- Enriched vocabulary
- Attain highest moral values

**Unit I: Stories from the Mahabharata**

(12 Hrs)

1. Wilderness of Life
2. The Cat and the Mouse
3. The Salmali Tree

**Unit II: One Act Play**

(12 Hrs)

Urubhangam - Bhasa

**Unit III: Vocabulary**

(12 Hrs)

**Unit IV: Grammar I**

(12 Hrs)

1. Relative pronouns
2. Adverbs
3. Prepositions
4. Phrasal verbs
5. Idioms

**Unit V: Grammar II**

(12 Hrs)

6. Active Voice & Passive Voice
7. Infinitives & Gerunds
8. Conditionals
9. Collocations
10. American and British words

**Book prescribed:**

Sivananda, Sri Swami. *Stories from the Mahabharata*. Tehri-Garhwal, Himalayas: The Divine Life Society, 1984.

Bhasa. *Urubhangam: One Act Play*. Samskrita Sahitya Sadana, 1967

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	III	BCHF182T30	General Chemistry- II	4	-	1	5

**Aim:** To study the basic concepts of chemistry

### Objectives

- To learn the basics of Qualitative analysis, solid state and colloids.
- To understand the chemistry of organic halogen compounds and phenols.
- To understand the basics of chemical kinetics and catalysis.

### Outcome

- The students are expected to gain knowledge about Qualitative analysis, chemical kinetics and catalysis.

### Unit I: Principles of wet chemical analysis

(15 hrs)

**Qualitative Analysis:** Solubility Product Principle- Factors affecting solubility- temperature, solvent common ion effect- effect of complex formation. - Spot test- interfering cations – reason for interference and method of removal.

**Titrimetry:** Definitions of Molarity normality, Molarity and mole fraction – Primary and Secondary standards – Types of titrimetric reactions – acid-base, redox, precipitation and complexometric titrations – Indicators – Effect of change in  $p^H$  – Theories of Neutralization, redox, adsorption and metal ion indicators.

### Unit II: Organohalogen Compounds

(15 hrs)

Nomenclature – general methods of preparation of haloalkanes – physical and chemical properties – nucleophilic substitution mechanisms ( $S_N1$ ,  $S_N2$  and  $S_Ni$ ) – evidences – stereochemical aspects of nucleophilic substitution mechanisms – Elimination reactions ( $E_1$  and  $E_2$ ) – Hoffmann Saytzeff rule-general methods of preparation of benzyl chloride – physical and chemical properties.

### Unit III: Chemistry of Phenols and Ethers

(15 hrs)

Preparation of phenols including di and tri hydric phenols – physical and chemical properties – uses –derivatives of phenol (aspirin, methyl salicylate, salol) - laboratory preparation of ethers, epoxides – 1,4 dioxane - physical and chemical properties – uses.

### Unit IV: Solid state and Colloids

(15 hrs)

Classification of solids – Laws of crystallography – representation of planes – Miller indices, space lattice, crystal systems – seven primitive, unit cells – X -ray diffraction – derivation of Bragg's equation – determination of structure of NaCl by Debye Scherrer (powder method) and rotating crystal method-Colloids-definition-classification – general methods of preparation (double decomposition, Mechanical dispersion methods only)–Purification-Mechanical, optical and electrical Properties of colloids –coagulation-peptization - gold number – applications of colloids.

**Unit V: Chemical Kinetics and Catalysis****(15 hrs)**

Rate of reaction, average and instantaneous rates, rate equation, order of reaction. Rate laws: rate constants – derivation of rate constants and characteristics for zero, first and second order (equal initial concentration) – derivation of half life period.

Methods of determination of order of reactions – half life period and graphical method – experimental methods of determination of rate constant of a reaction – volumetry, manometry, polarimetry.

Effect of temperature on reaction rate - concept of activation energy, energy barrier, Arrhenius equation. Theories of reaction rates - collision theory - derivation of rate constant of bimolecular gases reaction - failure of collision theory – Lindemann's treatment- Theory of absolute reaction rates.

Catalysis –Introduction, types and Examples.

**Text Books:**

1. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co., (1993)
2. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (1997)
3. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co., (1993)

**Reference Books:**

1. Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006)
2. Glasstone S., Lewis D., Elements of Physical Chemistry, London, Mac Millan & Co. Ltd. (1976)
3. Morrison R.T. and Boyd R.N., Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (1976)
4. Frank J. Welcher and Richard B. Hahn, Semi micro Qualitative Analysis, New Delhi, Affiliated East-west Press Pvt.Ltd.(1969)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	III	BCHF182T40	Applied Physics - II	3	-	1	3

**Aim:**

- To make students to get familiar with broad modules of Physics such as Nano Physics, Magnetism & Dielectrics, Engineering Materials, Optoelectronic Devices, Integrated Circuits & Logic Gates

**Objectives:**

- To impart knowledge to the students in the following areas;
- Basics nanoparticles, properties, synthesis and applications, Magnetic materials, properties and applications, Dielectric materials and their applications, basic ideas of metallic glasses, shape memory alloys and biomaterials and their applications, superconductivity, superconductors, their types and applications.
- Working principle and applications of LED, PMT, LCD, PN junction and Photo conductive cells.
- Introduction to ICs and various logic gate, IC fabrication and various logic operations.

**Outcome:**

- At the end of the course, the student might have acquired knowledge in the following topics;
- Nanoparticles, their size range, properties, synthesis and applications, Dia, Para and Ferro magnetic materials, properties and applications, Dielectric materials and their applications, Nature of metallic glasses, fabrication, shape memory alloys, biomaterials and their applications, occurrence of superconductivity, transition temperature, type I and II superconductors, and applications. Construction and working of LED, PMT, LCD, PN junction and Photo conductive cells. ICs and their fabrication processes, various logic gates and various logic operations.

**Unit I – Nano Physics**

Introduction to Nano materials - Quantum confinement – Properties of nano materials – Synthesis of nano materials – Top down and bottom up approach – Ball milling and Physical vapour deposition method – applications of nano materials – CNTs.

**UNIT II - Magnetism & Dielectrics**

Types of Magnetic materials(Dia,Para and Ferro)– properties – Application- Floppy Disc  
Dielectrics- Basic Definitions –Dielectric Breakdown – Dielectric loss – Internal field – Classius-Mossotti relation. Application of Dielectric materials

**UNIT III - Engineering Materials**

Introduction and Properties of Metallic glasses – Shape memory alloys – Bio materials Superconductors-  
Introduction – Meissner effect – Type I & Type II superconductors – High Tc Superconductors

**UNIT IV- Optoelectronic Devices**

Photomultiplier Tube –Photo Conductive cells – P-N junction Photodiode – PIN Photodiode- Avalanche Photodiodes - Light Emitting Diode (LED) –Liquid Crystal Display(LCD)

**UNIT V - Integrated Circuits & Logic Gates**

Introduction –Scale of Integration-Classification of IC's by Structure and function – Linear and Digital Integrated Circuits- Fabrication of IC Components – Logic Gates- Positive and Negative Logic- The OR, AND, NOT Gates – Symbols and Truth table for Logic Operations – Universal Gates – The NAND & NOR gates – Symbols and Truth Table for Logic operations

**Text Books**

1. Applied Engineering Physics – Rajendran&Marikani – Tata McGraw Hill
2. Modern Engineering Physics – R.K.Gaur&S.L.Gupta – DhanpatRai publications- 2011.
3. Modern Engineering Physics – A.S.Vasudeva – S.Chand& Company Ltd. -1999.
4. Engineering Physics – Bhattacharya, Bhaskaran – Oxford Publications 2010.
5. Engineering Physics – B.N.Shankar&S.O.Pillai – New Age International
6. Applied Physics for Engineers – Venkatramanan, Raja, Sundarajan –SCITECH - 2011
7. Basic Electronics (Solid State) – B.L Thereja– 2007.

**Reference Books**

1. Modern Physics - R.Murugesan. (Unit I) – 2011.
2. Engineering Physics - Rubhan Kumar. (Unit II) -
3. Engineering Physics - M.N.Avadhanulu. (Unit II&III ) - 1992.
4. Engineering Physics – P.K.Palanisamy - Scitech Publications (Unit II &III) – 2009.
5. Basic Electronics (Solid State) – B.L Thereja (Unit IV & V) – 2007.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	III	BCHF182T50	Programming in C	3	-	1	4

**Aim:**

- Introduce the students to get the programming skills of 'C' language via mathematical functions.

**Objective:**

- To gain experience about structured programming
- To help the students to understand the implementation of C language
- To understand various features in C.

**Outcome:**

After completion of the course,

1. Have knowledge on programming skills of 'C' language.
2. Deal with problem which may arrive in mathematics
3. Prepare for software companies, involving placement opportunities.

**Unit – I**

(12 hrs)

Introduction – Importance of C language – Basic structure of C program – Constants – Variables – Data types – Declaration of Variables – Assigning values to Variables. Operators and Expressions: Introduction – Types of Operators – Arithmetic expressions – Evaluations of expressions – Precedence of arithmetic operators – Type conversions in expressions.

**Unit – II**

(12 hrs)

Decision making and Branching: if, simple if, IF ELSE, Nesting of IF-ELSE, ELSE-IF ladder, SWITCH statement, the ?: operator, GO operator, goto statement. Decision making and looping: while, do, for statement, jumps in loops.

**Unit – III**

(12 hrs)

Arrays: Introduction – One dimensional array – Two dimensional arrays – initializing Two dimensional arrays – Multi dimensional arrays.

Functions: User defined functions: Introduction – Need for user defined functions – Return values and their return types – Calling a function – Category of functions – Nesting of functions – Recursion function.

**Unit – IV**

(12 hrs)

Pointers: Introduction – Accessing the address of the variable – Declaring and initializing Pointers – Accessing through its Pointers – Pointer expression, increments and scaling factor – Pointer and Arrays – Pointer and Character strings – Pointer and Function – Pointer and Structures – Pointer on Pointers.

**Unit – V**

(12 hrs)

Structures and Unions: Introduction – Structure definition – Giving value to members – Structure initialization – Comparison of Structures – Structures and Functions – Size of Structures – Unions. File handling: Defining and Opening a File – Closing a File – input/output operations on Files.

**Text Book:**

1. E. Balaguruswamy - "Programming in ANSI C", Tata McGraw Hill Publishing Company, sixth edition BPB publication 2005.

**Reference Book:**

1. Herbert Schildt, The complete reference, McGraw – Hill, 1998.
2. Byron C Gotfried, Programming with C, Schaums outline series, 2<sup>nd</sup> edition Tata McGraw Hill 2006.
3. The spirit of C, An introduction to modern programming, by Henry M. Mullish, Herbert Cooper, West Pub. Co., 1987.



Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	III	BCHF182P70	Major Practical- I	-	5	-	5

### MAJOR PRACTICAL – I- VOLUMETRIC ANALYSIS

#### *I Titrimetric Quantitative Analysis*

1. Estimation of HCl by NaOH using a standard oxalic acid solution
2. Estimation of Na<sub>2</sub>CO<sub>3</sub> by HCl using a standard Na<sub>2</sub>CO<sub>3</sub> solution
3. Estimation of oxalic acid by KMnO<sub>4</sub> using a standard oxalic acid solution
4. Estimation of Iron (II) sulphate by KMnO<sub>4</sub> using a standard Mohr's salt solution.
5. Estimation of Ca (II) by KMnO<sub>4</sub> using a standard oxalic acid solution.
6. Estimation of KMnO<sub>4</sub> by thio using a standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
7. Estimation of Fe (III) by using K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> using a standard Mohr's salt solution using internal and external indicators.
8. Estimation of copper (II) sulphate by K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution
9. Estimation of Mg (II) by EDTA solution
10. Estimation of Total Hardness of water
11. Estimation of chlorine in Bleaching Powder
12. Estimation of saponification value of an oil

#### **Reference:**

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

<b><u>Scheme of Valuation</u></b>	
<b>Record</b>	<b>10 marks</b>
<b>Procedure Writing</b>	<b>20 marks</b>
<b>Experiment</b>	<b>30 marks</b>
<b>Calculation</b>	<b>20 marks</b>
<b>Results</b>	<b>10 marks</b>
< 2 % - 10 marks	
3 % - 8 marks	
4 % - 6 marks	
5 % - 4 marks	
>5 % - 2 marks	
<b>Viva</b>	<b>10 marks</b>
<b>Total</b>	<b>100 marks</b>

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	III	BCHF182P80	Allied Physics Laboratory	-	3	-	2

**(ANY 10 EXPERIMENTS ONLY)**

1. Acceleration due to gravity-Compound pendulum method
2. Moment of inertia – Torsional pendulum method
3. Young's modulus - Uniform bending - Optic lever method
4. Young's modulus - Non-uniform bending - Pin and microscope
5. Rigidity modulus – Static torsion method.
6. Frequency of A.C - Sonometer
7. Thermal conductivity - Lee's disc method.
8. Refractive index of a solid prism - Spectrometer
9. Refractive index of a liquid prism – Spectrometer
10. (i-d) curve - solid prism - Spectrometer
11. Wavelengths of spectral lines – Grating - Normal incidence - Spectrometer
12. Wavelength of spectral lines – Grating - Minimum deviation - Spectrometer
13. Radius of curvature of lens - Newton's rings method.
14. Viscosity of highly viscous liquid - Stoke's method.
15. Surface tension - Drop weight method
16. Characteristics of Pn Junction diode
17. Characteristics of Zener diode
18. Verification of truth tables of logic gates.

**Reference Book:**

1. Engineering Physics Lab Manual – By Dr. K. Venkatramanan et al., SCSVMV, (2013)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
II	IV	BCHF182T60	Indian Culture	1	-	-	1

**Aim:**

- To create an opportunity to understand the value of human life.

**Objective:**

- This paper aims to provide awareness of the duties and responsibilities of human which framed by the early Sindh Vedic societies, is essential to passed on from one generation to the other, for the welfare of societies and to understand the significance of various social events. Ancient Indians made considerable scientific progress in the fields of science and technology. This paper also provides to draw linkages between modern science and rich Indian scientific advanced thoughts and applications.

**Outcome:**

- To know the duties and responsibilities of the human life.
- To get an idea about the samskaras
- To highlight the scientific aspects through literature.

**Unit I** (3 Hrs)

Duties & responsibilities of human; *gruhya sutras, smritis & sruties* – significance in day-to-day life.

**Unit II** (3 Hrs)

*Samskaras* or Sacraments – Important occasions & significance; Sixteen important *Samskaras* in due course of human life. Responsibilities of Human - four *Ashrama Dharmas*.

**Unit III** (3 Hrs)

Significance of social gatherings & celebrations of different occasions. Worship – personal and public rituals & their significance; so-cultural significance of festivals and impact on culture. Significance of Yoga in daily life.

**Unit IV** (3 Hrs)

Social significance of religion; evolution of religious thoughts and ritual practices; different philosophical Schools. structural evolution for ritual practices; significance of temples & other constructions. Civil engineering skill & construction technologies;

**Unit V** (3 Hrs)

Scientific thoughts of early Indians. Vedic Mathematics. Astrology & Astronomy. Scientific aspects in *Vastusastra*, etc. early Indian works and its importance in day-to-day life.

**Reference Books**

- Jagadguru Swami Sri Bharati Krishna Tirthaji Maharaj. 1994 *Vedic Mathematics*. Motilal Banarasidas. New Delhi.
- Joshi, K. 1992(rp). *The Veda and Indian Culture*. Rastriya Veda Vidya Pratishthana. New Delhi.
- Kangle, R.P. 1992 (rp). *The Kautilya Arthashastra*. Delhi.
- Kulkarni, R.P. 1983. *Geometry according to Sulba Sutra*. Samsodhana Mandal. Pune.
- Majumdar, R.C. 1994 (rp). *Ancient India*. Motilal Banarsidas Publishers. Delhi.
- Patel, I.S. (ed). 1984. *Science and the Vedas*. Bombay.
- Majumdar, R.C. 1996 (ed) (rp). *The History and Culture of the Indian People*. Vol I-IV. Bharatriya Vidya Bhavan. Mumbai

**Semester III**

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
III	I	BCHF183TT0	Tamil –III	3	-	1	3

**நோக்கம் :** தமிழின் சிறந்த அமைப்பான 'பக்தி இலக்கியம்' பற்றி உணர்வதற்காக சைவ, வைணவ இலக்கியப் பாடல்கள் தரப்பட்டுள்ளன. நீதி நூல் – திருக்குறளின் மேன்மை உணர 5 அதிகாரங்கள் தரப்பட்டுள்ளன. இலக்கிய வரலாறு பல்லவர் காலமும், உரைநடை சிறப்பு அறிய மு.வ. வின் கட்டுரைகளும், தமிழர் பண்பாடு பற்றி அறிதற்கான குறிப்புகளும் தரப்பட்டுள்ளன.

**பயன் :** அளவில் அதிகமான படைப்புகளை, பக்தி சார்ந்த படைப்புகளாகத் தமிழ் கொண்டுள்ளது என்பதுணர்வல் ;பக்திமொழி என்று தமிழ் அழைக்கப்படுவதை அறிதல் ; சைவ, வைணவ சமய நூல்களை அறிதல் ; பக்தி இயக்க காலத்தின் தொடக்கமான பல்லவர் கால இலக்கியங்களை அறிதல் ; தமிழர்களின் பண்பாடு பற்றிய சில செய்திகளைத் தெரிந்துகொள்ளல், அறிவுரை தரும் குறட்பா செய்திகளையும், மு.வ.வின் 'நல்வாழ்வு' பற்றிய செய்திகளையும் அறிதல்.

1. செய்யுள்
2. மொழித்திறன்
3. இலக்கிய வரலாறு
4. உரைநடை
5. தமிழ்ப் பண்பாடு

அலகு – 1 செய்யுள் (12 hrs)  
 1. திருக்குறள் – ஐந்து அதிகாரங்கள்  
 2. சம்பந்தர் தேவாரப் பதிகம் ஒன்று மட்டும்  
 3. குலசேகர ஆழ்வாரின் பெருமான் திருமொழி பாசுரப்பகுதி

அலகு – 2 மொழித்திறன் (12 hrs)  
 1. நேர்காணல்  
 2. கலைச்சொல்

அலகு – 3 இலக்கிய வரலாறு (12 hrs)  
 1. பல்லவர் கால இலக்கியங்களின் வரலாறு

அலகு – 4 உரைநடை (12 hrs)  
 1. மு.வ.வின். நல்வாழ்வு நூலில் 6 முதல் 10 தலைப்பு வரை

அலகு – 5 தமிழ்ப்பண்பாடு (12 hrs)  
 1. தமிழ்ப்பண்பாடு அறிமுகம் என்ற அளவில் சுமார் 45 பக்க அளவுள்ள செய்திகள்.

**பார்வை நூல்கள் :**

1. மொழித்திறன் – முனைவர். மு.வ., பாரி நிலையம், சென்னை.
2. நல்வாழ்வு – முனைவர். மு.வ., முல்லை நிலையம், சென்னை.
3. நல்ல தமிழ் எழுத வேண்டுமா? – அ. கி. பரந்தாமன், சென்னை.
4. தேவாரப் பதிகங்கள் – சண்முகம் பிள்ளை, நிரஞ்சன விலாச பதிகம், சென்னை.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
III	I	BCHF183TS0	Sanskrit –III	3	-	1	3

**Aim:**

- To understand the value of Sanskrit.

**Objective:**

- The Course offers a comprehensive knowledge about the mahabharat and Hitopadesa and to understand the moral values as reflected in the verse of mahabarata and in the story of the Hitopadesa.

**Outcome**

- To realize the unit features of the Sanskrit language
- To throw a light to understand the cultural heritage of India through the language of Sanskrit.

**Unit - I भाग: – क** (12 hrs)

Eloquence of Mahabharata 1-15 Verses

**Unit - II भाग: – ख** (12 hrs)

Eloquence of Mahabharata 16-30 Verses

**Unit - III भाग: – ग** (12 hrs)

Hitopadesa – Prologue Stories

1. Old Tiger and Traveller
2. Cat and Vulture

**Unit - IV भाग: – घ** (12 hrs)

Hitopadesa –Stories

1. Pair of Crows
2. Pair of Tittibhas
3. Rabbits and Elephant

**Unit - V भाग: – ङ** (12 hrs)

Hitopadesa –Stories

1. Jackal
2. Crane and Crab
3. Camel

**Text Books:**

1. Eloquence of Mahabharata, Prepared by Dept. of Sanskrit and Indian Culture, SCSVMV University.
2. Hitopadesa – Compiled by Dept of Sanskrit and Indian culture, SCSVMV University.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
III	I	BCHF183TH0	Hindi –III	3	-	1	3

**Aim:**

To introduce the students to Hindi language and its correct form and to attract them towards. The beauty of Hindi.

**Objective:**

- To develop communication skills and writing skills in Hindi for the students belong to Non- Hindi speaking areas.
- To create opportunities to the students to enter into job filed of Central Govt. Offices through Hindi.

**Outcome:**

- Have good communication skills
- Have writing and reading skills
- Deal with the situations where they need in switch on to different languages.
- To avail opportunities in job field.

**Unit –I**

(12 hrs)

Introduction To Vocabulary:

- Sabd Rachana and Sabd Vichar
- Prefix and Suffix practices
- Correction of Sentences

**Unit – II**

(12 hrs)

Hindi Literature – Old Poetry

- Kabir
- Mira Bai

**Unit – III**

(12 hrs)

Hindi Literature – Modern Poetry

- Vah Todti Patthar
- Himalay ke Prati

**Unit – IV**

(12 hrs)

Hindi Literature- Prose

- Nayak ka chunav (Story)

**Unit – V**

(12 hrs)

Hindi Literature- Prose

- Main Narak se Bol raha hoon (Vyangya)

**Text Books:**

- 'Saral Hindi Siksha' -1(Prepared by Department of Hindi, SCSVMV)
- 'Hindi Sahitya Sudha'(Edited by Department of Hindi, SCSVMV)

**Reference Books :**

- Saral Hindi Vyakarana – Shyam Chandra Kapoor (2009)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
III	II	BCHF183T20	English –III	3	-	1	3

**Aim:**

- To equip the linguistic competencies of students by introducing poetry and to develop the writing skills of students.

**Objective:**

- To introduce other genres of Literature.
- To understand and appreciate poetry as a literary genre
- To improve vocabulary
- To develop essential competencies for successful life
- To kindle creative and innovative thoughts

**Outcome:**

The students are expected to be able to

- Understand other genres of Literature
- Appreciate the nuances of poetry
- Improved language skills
- Ability to communicate ideas logically

**UNIT I: Poetry****(12 hrs)**

Maitreem Bhajata: A Benediction	-	Maha Periyava
Universal Prayer	-	Swami Sivananda
Where the Mind is Without Fear	-	Rabindranath
Tagore		

**UNIT II: Stories that foreground Indian Culture****(12 hrs)**

1. Truth at any cost
2. Character, not caste, makes for Superiority
3. Man, the master of his destiny

**UNIT III: One Act Play****(12 hrs)**

Karnabharam	-	Bhasa
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**UNIT IV: Vocabulary****(12 hrs)****UNIT V: Modes of Communication****(12 hrs)**

1. Writing
2. Degrees of Comparison
3. Factual Writing

**Book Prescribed:**

<http://www.acharya.gen.in:8080/maitreem.php> <https://www.sivananda.eu/en/meditation/the-4-yoga-paths/universal-prayer.html>

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
III	III	BCHF183T30	Analytical chemistry	4	-	1	5

**Aim:** To learn about laboratory hygiene, safety and basic analytical chemistry techniques.

**Objective:**

- To learn the basic analytical methods and appreciate what is involved in an analysis.
- To understand the different types of basic analytical methods available.

**Outcome:**

- Understanding on laboratory hygiene, safety precautions
- Understanding on various analytical techniques available for chemical analysis and characterization.

**Unit I: Introduction to analytical chemistry (15 hrs)**

**Laboratory Hygiene and safety:** Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous chemicals. Simple first aid procedures for accidents involving acids, alkalis, bromine, burns and cut by glass. Threshold vapour concentration - safe limits. Waste disposal and fume disposal.

**Evaluation of analytical data:** Mean, median and mode - Accuracy and precision – ways of expressing accuracy and precision -Errors - types -determinate, indeterminate and gross errors - minimization of errors - methods of reporting data - significant figures.

**Unit II: Gravimetric analysis (15 hrs)**

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 agents.

**Unit III: Thermo analytical techniques (15 hrs)**

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 - determination of purity of pharmaceuticals by DSC.

Thermometric titration – principle and instrumentation – titration of HCl Vs NaOH – complexometric titration – applications.

**Unit IV: Electro analytical Techniques (15 hrs)**

Electro gravimetry –theory - electro gravimetric analysis of Fe and Cu, Electrolytic separation of metals: principle –separation of copper and nickel, Electro deposition- principle –overvoltage, Coulometry -Principle of coulometric analysis – coulometry at controlled potential- apparatus and technique-separation of nickel and cobalt. Amperometry titrations - principle –Instruments – types-applications.



**Unit V: Chromatography techniques**

**(15 hrs)**

Chromatography – definition – types – principle, theory and applications of Column, Thin layer, paper, Ion-exchange, Gas and HPLC chromatographic techniques.

**Text Books:**

1. Goplan. R., Subramaniam P.S., Rengarajan K., Elements of Analytical Chemistry, sultan Chand & Sons., (2004)
2. Durbha Charan Dash, Analytical Chemistry, PHI Learning Pvt. Ltd., (2011)

**Reference Books:**

1. Sharma. B.K., Analytical Chemistry, Krishna Pragasan Media Pvt. Ltd., (2011)
2. Douglas A. Skoog, Donald M. West, F.J. Holler, Fundamental of Analytical Chemistry, Saunders College publishing, (1994)
3. Mendham J., Denney R.C., Barnes J.D., Thomas M., Vogel's Text Book of Qualitative Chemical Analysis, Pearson educations, (2000)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
III	III	BCHF183T4A	Allied Mathematics-I	3	-	1	4

**Aim:**

- Introduce the students to the foundational aspects of matrices and their utility, expansion of trigonometric series, Numerical methods, successive differentiation and definite, indefinite integrals.

**Objective**

- To introduce the concepts of matrices and their utility
- To familiarize the concepts of expansion of series, numerical methods, successive differentiation and definite, indefinite integrals.

**Outcome:**

After completion of the course the students are expected to be able to

- Have the knowledge in matrices and their utility.
- Identification of different type of trigonometric series and to solve that series.
- To solve algebraic, transcendental and linear simultaneous equations using Numerical Methods.
- To solve successive differentiation using famous theorem.
- Have the basic knowledge in definite and indefinite integrals.

**Unit-I**

(12 Hrs)

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Rank of a matrix -Consistency of equations - Eigen roots and eigen vectors - Cayley- Hamilton theorem (without proof)-Verification and computation of inverse matrix

**Unit-II**

(12 Hrs)

Expansions of  $\sin x$ ,  $\cos x$ ,  $\tan x$  in terms of  $x$ ;  $\sin nx$ ,  $\cos nx$ ,  $\tan nx$ ,  $\sin^n x$ ,  $\cos^n x$ ,  $\tan^n x$ , hyperbolic and inverse hyperbolic functions – Simple problems.

**Unit-III**

(12 Hrs)

Solution of algebraic and transcendental equations-Bisection Method- Method of false position- Newton – Raphson method-Solution of linear simultaneous equations- Gauss elimination method- Gauss Jordan method-Gauss Seidal method

**Unit-IV**

(12 Hrs)

Successive Differentiation-  $n$ th order derivatives of standard functions- Leibnitz theorem (without proof)-simple problems- Partial differentiation- Euler's theorem- Problems on Euler's theorem

**Unit-V**

(12 Hrs)

Evaluation of definite and indefinite Integrals of types

$$\begin{array}{lll}
 1. \int \frac{px+q}{ax^2+bx+c} dx & 2. \int \frac{px+q}{\sqrt{ax^2+bx+c}} dx & 3. \int \frac{1}{(px+q)\sqrt{ax^2+bx+c}} dx \\
 1. \int \frac{1}{a+b\cos x} dx & 5. \int \frac{1}{a+b\sin x} dx & 6. \int \frac{a\cos x+b\sin x+c}{l\cos x+m\sin x+n} dx \\
 7. \int_0^{\frac{\pi}{2}} \sin^n x dx & , & \int_0^{\frac{\pi}{2}} \cos^n x dx
 \end{array}$$

**Reference books:**

1. Trigonometry : P. Duraipandian (1984)
2. Matrices: A.R.Vasishtha , A.K.Vasishtha (1991)
3. Numerical Methods, Problems and Solutions: M.K.Jain, S.r.K Iyengar, R.K.Jain (2003)
4. Calculus. S.Narayanan and T.K.Manicavachagom Pillay (2004). S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.
5. Algebra and Trigonometry, Vol.-I & II, A.Singaravelu, Meenakshi Agency, Chennai. (2003)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
III	III	BCHF183T4B	Allied Computer Science-I	3	-	1	3

**Aim:**

- To understand the concepts of object oriented programming and Master oops using C++

**Objective:**

- Develop application using object oriented programming
- Solving problems using object oriented approach

**Outcome:**

- Knowledge Enrichment
- Critical analysis where programming gaps are identified
- Problem solving
- Design and Implement using C++

**UNIT - I**

**Principles of Object Oriented Programming (OOP)** - Software Evaluation - OOP Paradigm - Basic Concepts of OOP - Benefits of OOP - Application of OOP.

**UNIT - II**

**Introduction to C++** - Tokens - Keywords - Identifiers - Variables - Operators - Manipulators - Expressions and Control Structures - Pointers - Functions - Function Prototyping - Parameters Passing in Functions - Values Return by Functions

**UNIT - III**

**Classes** - objects - this pointer - constructor - destructor - inline function - friend function - scope resolution operator – operator overloading and Type Conversations.

**UNIT - IV**

**Inheritance** - Types of Inheritance - Constructors in inheritance - virtual base classes - Virtual functions and Polymorphism - abstract classes - templates -generic functions - generic classes

**UNIT - V**

**Files** - I/O streams - manipulators - files - writing and retrieving objects from files.

**REMARKS**

**“EACH UNIT IS TO BE COVERED IN 12 PERIODS EACH OF 50 MINUTES DURATION”**

**Total No of Periods : 60**

**TEXT BOOKS:**

1. Programming in C++ : Balaguruswamy 5th Edition Tata Mcgraw Hill Education Private Limited (2011) .
2. C++: “How To Program” by Paul J.Deitel , Harvey M.Deitel, Prentice Hall, 2010

**REFERENCE BOOKS:**

1. Object Oriented programming Using C++ -by Robert Lafore. ‘Waite’s Group’.
2. The Complete Reference by Herbert Schildt.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
III	IV	BCHF183T50	Chemistry in Everyday life	1	-	1	1

**Aim:** To get the knowledge about the usage of chemicals.

**Objectives:**

- To know the basics of chemistry in our life
- To know about the food colours, Plastics, drugs etc

**Outcome:**

- To gain knowledge about the adulterants in food materials
- To study about chemicals

**Unit I : Cosmetics & Detergents**

(5 hrs)

General Survey of Chemicals used in everyday life.

Cosmetics: Talcum Powder, Tooth pastes, Shampoos, Nail Polish, Perfumes, Soaps, and detergents - General formulations and preparation - possible Hazards of cosmetics use.

**Unit II: Food Preservation & Adulteration**

(5 hrs)

Adulterants in milk, ghee, oil, coffee powder, tea, asafoetida, chilli powder, pulses and turmeric powder - identification. Colour chemicals used in food - soft drinks and its health hazards.

Food preservatives-Definition-Examples-Methods of preservation-Low and high temperature-Dehydration.

**Unit III: Polymeric Materials**

(5 hrs)

Plastics, polythene, PVC, bakelite, polyesters, resins, and their applications.

Natural Rubber-Synthetic rubbers-Vulcanization - definition and its applications.

**Text Books:**

1. Industrial Chemistry, B.K. Sharma- Goel publishing house Meerut. (2003)
2. Food Science - B. Srilakshmi - III Edition - New Age International Publishers. (2005)

**Reference Books:**

1. Chemical Process Industries - Norris Shreve Joseph A.Brine .Jr. (1977)
2. Environmental Chemistry - A .K. DE. (2003)
3. Food Chemistry Lillian Hoagland Meyer - CBS publishes & distributors (2004)
4. Fundamental concepts of Applied Chemistry - Jayashree Ghosh - S.Chand & Co Ltd., New Delhi. (2008)
5. Applied chemistry - K.Bagavathi Sundari - MJP Publishers. (2006)

## Semester IV

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	I	BCHF184TT0	Tamil -IV	3	-	1	3

**நோக்கம்** – தமிழின் தொன்மை இலக்கியமான சங்ககாலத்தில் அகம், புறம் இலக்கியம் பற்றி அறிய குறுந்தொகை, புறநானூறு பாடல்கள் தரப்பட்டுள்ளன. காப்பியச் சிறப்புணர் சிலம்பும், பெரியபுராணமும் உள்ளன. மொழி நூல் நோக்கில் தமிழின் பெயர், வினைச்சொல் பற்றியும், நாயக்கர் கால இலக்கியங்கள் பற்றிய குறிப்புகளும் பயிற்றுவிக்கப்படவுள்ளன.

**பயன் :** தமிழில் என்றென்றும் சிறந்த படைப்பாகத் திகழும் 'சங்க இலக்கியம்' பற்றி அறிதல் ; தமிழ்க் காப்பியங்கள் பற்றி அறிதல்; தமிழ்ச் சொல் இலக்கணம், சொல் பற்றிய வகைமை, அமைப்பு பற்றி அறிதல் ; நாயக்கர் காலத்தில் தோன்றிய, சிறந்த இலக்கியநூல்களையும், உரையாசிரியர்கள் தமிழ்க்குச் செய்த தொண்டினையும் உணர்தல்.

1. செய்யுள்
2. இலக்கணம்
3. இலக்கிய வரலாறு

அலகு – 1 செய்யுள் (12 Hrs)

1. குறுந்தொகை – 10 பாடல்கள்  
பா.எண்ணு 02, 03, 16, 20, 31, 40, 49, 69, 124, 167.
2. புறநானூறு – 03 பாடல்கள்  
பா.எண்ணு 18, 266, 279.
3. சிலப்பதிகாரம் – வழக்குரை காதை  
80 அடிகளும், 3 வெண்பாக்களும்.
4. பெரிய புராணம் – அப்பூதியடிகள் நாயனார் புராணம்  
45 பாடல்கள்.

அலகு – 2 இலக்கணம் (12 Hrs)

தமிழ் மொழியின் அமைப்பு  
சொல்லியல் – பெயர்ச்சொல், வினைச்சொல்

அலகு – 3 இலக்கிய வரலாறு (12 Hrs)

2. நாயக்கர் காலம் – சிற்றிலக்கியங்கள், உரையாசிரியர்கள்

**பார்வை நூல்கள் :**

1. குறுந்தொகை – உ.வே.சா., அண்ணாமலை பல்கலைப் பதிப்பகம், சிதம்பரம்.
2. புறநானூறு – புலியூர் கேசிகன், அருணா பதிப்பகம், சென்னை.
3. சிலப்பதிகாரம் – புலியூர் கேசிகன், அருணா பதிப்பகம், சென்னை.
4. பெரியபுராணம் – தருமையாதீனம், மயிலாடுதுறை.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	I	BCHF184TS0	Sanskrit -IV	3	-	1	3

**Aim:**

- To understand the value of Sanskrit.

**Objective:**

- The course concentrates to understand the story of Ramayana through Ramondantam in a good manner and also get the pleasure by reading the story of lord Krishna in a prose form through the text of vyasavacanabhadra

**Outcome**

- To realize the unit features of the Sanskrit language
- To throw a light to understand the cultural heritage of India through the language of Sanskrit.

**Unit - I भाग: – क (12 Hrs)**

Ramandantam- Balakanda 1-20 Verses

**Unit - II भाग: – ख (12 Hrs)**

Ramandantam- Balakanda 21-30 Verses

**Unit - III भाग: – ग (12 Hrs)**

Vyasavacanabhadra (From Kathamukham to Putanavadha)

**Unit - IV भाग: – घ (12 Hrs)**

Vyasavacanabhadra – (From Sakatabhanga to Devendragarva Bhanga)

**Unit - V भाग: – ङ (12 Hrs)**

Poets of Sanskrit – Kalidasa, Bharavi, Magha, Sriharsa.

**Text Books:**

1. Ramandantam – R.S. Vadhyar and son. Palaghat.
2. Vyasavacanabhadra – K.Srinivasacari, The little flower & Co, Madras.
3. History of Sanskrit literature.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	I	BCHF184TH0	Hindi -IV	3	-	1	3

**Aim:**

- To introduce the students to Hindi language and its correct form and to attract them towards. The beauty of Hindi.

**Objective:**

- To develop communication skills and writing skills in Hindi for the students belong to Non- Hindi speaking areas.
- To create opportunities to the students to enter into job filed of Central Govt. Offices through Hindi.

**Outcome:**

- Have good communication skills
- Have writing and reading skills
- Deal with the situations where they need in switch on to different languages.
- To avail opportunities in job field.

**Unit –I**

( 12 hrs)

Introduction To Functional Hindi:

- Raj Bhasha Rashtra Bhasha and Sampark Bhasha
- Functional Hindi- Introduction

**Unit – II**

( 12 hrs)

Introduction To Official Language Terminology :

- Technical usage of Official Terminology
- Introduction to Official Language – Glossary

**Unit – III**

( 12 hrs)

History Of Hindi Literature:

- Introduction to History of Hindi Literature
- The different periods of Hindi Literature – an Outlook

**Unit – IV**

( 12 hrs)

History Of Hindi Literature- Famous Personalities

- Famous Hindi Poets
- Famous Hindi Prose Writers

**Unit – V**

( 12 hrs)

Letter Writing

- Different models of Letters – Practice
- Personal Letters- Practice
- Official Letters - Practice

**Text Book:**

- 'Sara Hindi Siksha' -2(Prepared by Department of Hindi, SCSVMV)
- 'Hindi Sahitya Sudha' (Edited by Department of Hindi, SCSVMV)

**Reference Books:**

- Sara Hindi Vyakaran – Shyam Chandra Kapoor (2009)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	II	BCHF184T20	English-IV	3	-	1	3

**Aim:**

- To develop professionalism in writing

**Objective:**

- Students get introduced to real life situations and language to be adopted in communication.
- To write clearly and effectively
- Ability to communicate ideas logically
- To offer a platform to express creativity

**Outcome:**

The students are expected to be able to

- Developed LSRW skills
- Write effectively
- Attain excellence in expressing ideas
- Communicate clearly and coherently.

**Unit-1:** (12 Hrs)

Letter Writing

**Unit II:** (12 Hrs)

Comprehension

**Unit III:** (12 Hrs)

Report Writing

**Unit IV:** (12 Hrs)

Dialogue Writing

**Unit V:** (12 Hrs)

Group Discussion

**Text Book:**

Bikaram K. Das: *Functional Grammar and Spoken and Written communication in English.*

Chennai: Orient Blackswan. 2006.



Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	III	BCHF184T30	Spectroscopic methods of analysis	4	0	1	5

*Aim: Familiarizing the concepts and simple applications of spectroscopic methods*

**Objective:**

- To understand the Basic concepts of spectroscopic methods

**Outcome:**

- Understanding the principles of spectroscopy and its applications

**Unit I: Introduction to spectroscopy (15 hrs)**

EM radiation, quantization of energy, regions of spectrum, interaction of radiation with matter. Origin of spectrum - representation of spectra, spectrometers, signal to noise ratio, resolving power, parameters for a spectral line- factors affecting position, intensity, width. Spectroscopy and spectrometry - differences.

**Unit II: Microwave spectroscopy (15 hrs)**

Rotational spectra of diatomic molecules treated as rigid rotator - condition for a molecule to be active in microwave region- rotational constants (B), and selection rule - Frequency of spectral lines, calculation of inter – nuclear distance in diatomic molecules. Isotopic substitution and its effects. Instrumentation of a MW spectrometer.

**Unit III: IR and Raman spectroscopy (15 hrs)**

**IR:** Vibrations of diatomic molecules – bond as 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, Determination of force constant.

**Raman:** 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. Mutual exclusion principle.

**Unit IV: UV – Visible spectroscopy and colorimetry (15 hrs)**

**UV visible spectroscopy:** Theory of electronic spectroscopy - chromophore and auxochromes - Franck - Condon principle – pre-dissociation - Description of UV-Vis spectrophotometer - Applications of UV- Visible spectroscopy

**Colorimetry:** - Principle of colorimetric analysis - visual colorimetry –Nessler’s methods- Dubosque method -estimation of Ni<sup>+2</sup> and Fe<sup>+3</sup> calorimetrically - photoelectric photometer method.

**Unit V: NMR and ESR spectroscopy (15 hrs)**

**NMR spectroscopy:** nuclear spin – NMR active nuclei -theory of NMR spectra- number of signals - equivalent and non - equivalent protons - position of signals - chemical shift,  $\delta$  and  $\tau$  scales - Peak area and number of protons - spin – spin coupling – NMR of simple molecules.

**ESR Spectroscopy:** Principle of ESR - Position of ESR absorption- presentation of ESR spectrum – g factor – DPPH Radical.

**Text Books:**

1. Gopalan. R., Subramaniam P.S., Rengarajan K., *Elements of Analytical Chemistry*, Sultan Chand & Sons., (2004)
2. Drubha Charan Dash, *Analytical Chemistry*, PHI Learning Pvt. Ltd., 1<sup>st</sup> edition (2011)  
Donald.L.Pavia., Gary.M.Lampman., & George.S.Kriz., *Introduction to Spectroscopy*, Cengage Learning India Pvt.Ltd., 3<sup>rd</sup> edition (2008)

**Reference Books:**

1. Douglas A. Skoog, F. James Holler, Stanley R. Crouch, *Principles of Instrumental Analysis*, Cengage; 6 edition (2014)
2. Yadhav.B. *Spectroscopy*, S.chand Company, 2<sup>nd</sup> edition ( 2007)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	III	BCHF184T40	Allied Mathematics-II	3	-	1	4

**Aim:**

- Introduce the students to the foundational aspects of series, ordinary differential equation, Multiple integrals, Beta & Gamma function, Numerical methods.

**Objective:**

- Solve the partial fraction and various types of series, Identify and solve the 1<sup>st</sup> order, higher order ordinary differential equation, compute the double and triple integrals, Beta and gamma functions.
- Solving ordinary differential equation, integration, finite differences by numerical methods.

**Outcome:**

After completion of the course the students are expected to be able to

- 1) Identification of different type of series and to solve the series.
- 2) To solve the Ordinary differential equation.
- 3) Have the basic knowledge in multiple integrals.
- 4) To solve problems using Beta & Gamma functions.
- 5) To solve ODE using Numerical Methods.

**Unit-I**

(12 hrs)

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation -Simple problems

**Unit- II**

(12 hrs)

Ordinary differential equations- Equations of first order and first degree - Variable separable method- Homogeneous differential equations- Linear differential equations - Higher order linear differential equations with constant coefficients- Finding particular integral of  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ ,  $x^k$  and  $e^{ax} \cdot f(x)$

**Unit-III**

(12 hrs)

Evaluation of Double integral- Triple integral integrals in simple form (Cartesian only) - Beta and Gamma functions

**Unit-IV**

(12 hrs)

Numerical solution of ordinary differential equations- Euler's Method-Modified Euler's method-Runge method- Runge- Kutta method

**Unit-V**

(12 hrs)

Finite differences- Newton's forward difference formula- Newton's backward difference formula- Lagrange's formula- Numerical integration- trapezoidal rule- Simpson's 1/3<sup>rd</sup> rule- Simpson's 3/8<sup>th</sup> rule

**Reference books:**

1. M.D. Raisinghania, Ordinary and Partial Differential Equations, S.Chand and Co., (2001)
2. Numerical Methods, Problems and Solutions: M.K.Jain, S.r.K Iyengar, R.K.Jain (2007).
3. S.Narayanan and T.K.Manicavachagom Pillay, Calculus. S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai (2004).
4. Singaravelu. A, Algebra and Trigonometry, Vol.-I & II Meenakshi Agency, Chennai. (2003)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	III	BCHF184T50	Allied Computer Science-II	3	-	1	3

**Aim:**

- To understand the concepts of object-oriented programming and Master oops using C++

**Objective:**

- Develop application using object-oriented programming
- Solving problems using object-oriented approach

**Outcome:**

- Knowledge enrichment
- Critical analysis where programming gaps are identified
- Problem solving
- Design and implement using C++

**UNIT - I**

Definition of a Data structure - primitive and composite Data Types, Asymptotic notations, Arrays, Operations on Arrays.

**UNIT - II**

Stacks - Applications of Stack - Infix to Postfix Conversion, Recursion, - Queues - Operations on Queues, Circular Queue.

**UNIT - III**

Sorting - Bubble sort - Insertion sort - Selection sort - Quick sort - Merge sort - Heap sort - Searching - Linear search - Binary search.

**UNIT - IV**

Linked lists - Representation - operations - Linked stacks and queues - Doubly linked lists - Header linked lists - Polynomial addition.

**UNIT - V**

Trees - Binary Trees - Memory representation - Traversal algorithms - Threaded Binary trees - Binary search trees - Graph - Definition, Types of Graphs, Graph Traversal

**TEXT BOOKS:**

1. E.Horowitz and S. Shani Fundamentals of Data Structures in C++, Galgotia Pub. 1999

**REFERENCE BOOKS:**

1. Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 1998.
2. R. Kruse C.L. Tondo and B. Leung, Data Structures and Program design in C, PHI, 1997.

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	III	BCHF184P60	Major Practical- II- Qualitative Inorganic Analysis	-	5	-	5

### Semi micro inorganic analysis

Analysis of a mixture containing two cations and two anions of which one will be an interfering ion. Combination of salts forming insoluble precipitates should be avoided. Semi micro methods using the conventional scheme with hydrogen sulphide may be adopted.

**Cations to be studied:** lead, copper, bismuth, cadmium, iron, aluminum, zinc, manganese, cobalt, nickel, barium, calcium, strontium, magnesium and ammonium.

**Anions to be studied:** Carbonate, Sulphate, nitrate, chloride, fluoride, borate, oxalate, and phosphate.

### Reference Books:

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons (1997)
2. R.Mukhopadhyay,P.Chatterjee.,Advanced Practical Chemistry,3<sup>rd</sup> edition,Arunabha Sen Books & Allied Pvt,Ltd. (2007)
3. V.V. Ramanujam, Inorganic semi micro qualitative analysis, 3<sup>rd</sup> edition, The National publishing company, (1974)
4. Gurdeep Raj, Advanced Practical Inorganic Chemistry,15<sup>th</sup> edition, (2001)

Scheme of Valuation	
Record	10 marks
Procedure & Analysis	70 marks
a) Acid radicals (2 x 15=30 marks)	
b) Group separation (10 marks)	
c) Basic radicals (2 x 15=30 marks)	
Result	10 marks
Viva	10 marks
<b>Total</b>	<b>100 marks</b>

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	III	BCHF184P70	Allied Computer Science laboratory	-	3	-	2

Any 12

1. Write a C++ Program to illustrate Scope resolution operator.
2. Write a C++ Program to illustrate Class implementation
3. Implementation of Array of objects
4. Write a C++ Program to illustrate Friend function, Inline function, and Friend class
5. Write a C++ Program to illustrate the use of Constructors and Destructors and Constructor
6. Write a C++ Program to illustrate the use of Function overloading and Operator overloading
7. Write C++ Programs and incorporating various forms of Inheritance
8. Write a C++ Program to illustrate Virtual functions
9. File Handling – Read, Write, Update
10. Implementation of stack using array
11. Implementation of queue using array
12. Implementation of Insertion sort
13. Implementation of Quick sort
14. Implementation of Array insertion and deletion
15. Implementation of binary searching

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
IV	IV	BCHF184E80	Water analysis and treatment	1	-	1	1

*Aim: To study the characteristics of potable water.*

**Objective:**

- To learn about various methods of treatment and analysis of water

**Outcome:**

- Students gain knowledge about various softening methods of hard water.

**Unit I: Physicochemical properties of water (5 hrs)**

Introduction - characteristics of water - colour, turbidity, odour, taste, temperature, pH and electrical conductivity - Total solids -alkalinity - hardness - unit of hardness - Purification of water for drinking purpose - clarification - coagulation - contact & electro chemical coagulation - sterilization & disinfection of water - precipitation - aeration - ozonisation - Chlorination.

**Unit II : Water Treatment (5 hrs)**

Hard water and industries - industrial water treatment - boiler feed water - methods of softening - prevention of plumbo solvency - scales in boilers - consequences - internal conditioning methods. Desalination of brackish water - electro dialysis - Reverse osmosis. Water softening methods - Clark's process - lime soda process - modified lime soda process - permutit or zeolite process - Ion exchange process - demineralization of water.

**Unit III: Water analysis (5 hrs)**

Water analysis - sampling of water for analysis - chemical substances affecting potability - - Analysis of chemical substances affecting health - NH<sub>3</sub>, Nitrate, Nitrite, cyanide, fluoride, phenolics - Dissolved oxygen - Bio Chemical Oxygen Demand (BOD) - Chemical Oxygen Demand (COD).

**Text Book**

1. Industrial Chemistry - B.K. Sharma - Goel publishing house, Meerut. (2003)
2. Engineering Chemistry, Jain and Jain – Himalya Publishers, New Delhi (2004)

**Reference Books:**

1. Pollution control in process industries - S.P. Mahajan - Tata McGraw - Hill Publishing Company Ltd., New Delhi. (1985)
2. Water pollution and management - C.K. Varashney - Wiley Eastern Ltd., Chennai - 20. (1993)

**Semester-V**

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
V	III	BCHF185T10	Inorganic Chemistry -I	4	0	1	5

**Aim:** To study about coordination compounds

**Objective:**

- To understand the concepts of coordination and aspects of inorganic solid state chemistry
- To familiarize with some applications of coordination compounds

**Outcome:**

- Students get knowledge about the various theories of coordination chemistry
- Gets an idea about solid-state chemistry and organo metallic compounds.

**Unit I: Coordination Chemistry - I****(15 hrs)**

Definition of coordination compounds. Sedgwick's effective atomic number (EAN) concept-Illustrations and problems. Types of Isomerisms in coordination compounds with illustrations. Werner's coordination theory. Electrical conductivity and precipitation studies. Classification of ligands. Stability constant of coordination compounds – Stepwise and Cumulative (determination not required). Chelates –IUPAC system of nomenclature of coordination compounds.

**Unit II: Coordination Chemistry - II****(15 hrs)**

The Valence Bond theory (VBT) of coordination compounds. Its successes and limitations. Classification as inner orbital and outer orbital complexes. Stabilization of unusual oxidation states. The crystal field theory (CFT). d-orbital splitting pattern in octahedral, tetrahedral and square planar fields. Crystal field stabilization energy (CFSE), its calculation and importance. Evidences for covalent interaction between metal and ligands in complexes (d-d transitions, nephelauxetic effect). Racah parameter - Basic principles of Molecular Orbital Theory (MOT). The MOT of coordination compounds as applied to octahedral complexes without pi-bonding and its MO correlation diagram of  $[\text{Co}(\text{NH}_3)_6]^{3+}$ .

**Unit III: Application of Coordination Compounds****(15 hrs)**

Biologically important coordination compounds - metallo porphyrin-Chlorophyll, Haemoglobin, Vitamin B<sub>12</sub> (Structure only). Synthesis and structure of metal carbonyls – carbonyls of Ni, Co, Fe and Mn - nitrosyl compounds - classification, preparation and properties - sodium nitroprusside.

**Unit IV: Inorganic Solid-State Chemistry****(15 hrs)**

Metallic state - packing of atoms in metal (BCC, FCC, HCP and Simple cube) – theories of metallic bonding - electron gas, Pauling and band theories - structure of alloys - substitution and interstitial solid solutions - Hume Rothery ratio. Radius ratio rule & its application in determination of structure of solids like ZnS, Wurzite, fluorite, anti-fluorite - crystal defects - Schottky and Frenkel defects.



**Unit V: Organometallic Compounds****(15 hrs)**

Definition & types –metal alkyls- $\text{Et}_3\text{Al}$  metal pi ligand complexes- hapticity-metal alkene complexes-Zeisel salt –m-cp complexes- types- $\eta^1$  and  $\eta^5$  complexes-ferrocene –preparation-structure-properties. Industrial uses of organometallic compounds-Ziegler-Natta catalysis-Fischer- Tropsch synthesis.

**Text Book:**

1. Madan, R.D. Modern Inorganic chemistry (1987)
2. Puri, B.R., Sharma, L.R. and Kalia, Principles of Inorganic Chemistry, New Delhi (2002)
3. Gopalan, R., Ramalingam, V. Concise Coordination Chemistry, Vikas Publishing House Pvt. Ltd. (2007)

**Reference Books:**

1. Soni, P.L., Text Book of Inorganic Chemistry, S, Chand & Co, New Delhi (2006)
2. Lee, J.D., Concise Inorganic Chemistry, ELBS Edition (2009)
3. Cotton.F.A., Wilkinson.G., Munillo.C.A.,Bochmann.M,Advanced Inorganic Chemistry,John Wiley Sons,(2007)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
V	III	BCHF185T20	Organic Chemistry -I	4	0	1	5

**Aim:** To develop the knowledge about carbonyl compounds, carboxylic acids, nitrogen compounds and heterocyclic compounds.

**Objective**

- To understand the systematic chemistry of carbonyl compounds, carboxylic acids, nitrogen compounds and heterocyclic compounds.

**Outcome:**

- Students are expected to get knowledge about carbonyl groups, acid groups and nitrogen groups.
- Understanding on industrial process and preparation of chemicals.

**Unit I: Chemistry of carbonyl compounds (15 hrs)**

Introduction - nomenclature – structure of carbonyl compounds - acidity of alpha - hydrogen nucleophilic addition (HCN, ammonia derivatives, NaHSO<sub>3</sub>) – aldol – Claisen-Schmidt-Cannizaro - Benzoin – Perkin - Haloform reactions, FC acylation, Characteristic Reactions: Grignard, Metallic hydrides- Reduction reactions -Clemmenson, MPV, Wolff-Kishner reduction. Concept of enolization-Tautomerism.

**Unit II: Chemistry of carboxylic acid (15 hrs)**

Nomenclature - general methods of preparation of mono and dicarboxylic acids - Introduction to derivatives of carboxylic acids - physical and chemical properties - uses - nucleophilic substitution mechanism at acyl carbon - acyl chlorides, anhydrides, esters, amides – preparation and synthetic applications of diethyl malonate and ethyl aceto acetate.

**Unit III: Chemistry of nitrogen compounds (15 hrs)**

Nitrogen compounds - nomenclature - nitro alkanes - aromatic nitro compounds - preparation and reduction of nitro benzene under different conditions. Amino compounds - effect of substituents on basicity, reaction of amino compounds primary, secondary, tertiary and quaternary amine compounds). carbylamine reaction, diazotization and comparison of aliphatic and aromatic amines - diazonium compounds - preparation and synthetic importance of diazomethane and benzene diazonium chloride.

**Unit IV: Chemistry of heterocyclic compounds (15 hrs)**

Heterocyclic compounds - nomenclature - preparation and properties of furan, pyrrole, thiophene -comparison of the basicities of pyrrole, pyridine and piperidine with amines - synthesis and reactions of quinoline, isoquinoline and indole with special reference to Skraup, Bischer Napieralski and Fischer - indole synthesis .

**Unit V: Industrial organic chemistry (15 hrs)**

Production of industrial chemicals by fermentation - ethanol, acetic acid and acetone- Dyes – theory of colour and constitution - chromophore, auxochrome- classification of dyes – natural dyes (Indigo) – azo dyes (Methyl Orange, Bismark brown) – triphenyl methane dyes (Malachite Green, Crystal violet)and its applications.

**Text Books**

1. Bahl B.S, Arun Bahl, Advanced Organic Chemistry, (12th edition) New Delhi, Sultan Chand and Co., (1997)
2. Morrison R.T., Boyd R.N., Organic Chemistry, (6th edition) New York, Allyn & Bacon Ltd., (2006)
3. K.S Tewari.,N.K Vishnoi.,A Text book of Organic Chemistry,(3<sup>rd</sup> edition)Vikas Publishing House PVT Ltd.,(2006)

**Reference Books :**

1. Finar I.L,Organic Chemistry, Vol 1&2, (6th edition) England, Addison Wesley Longman Ltd. (1996)
2. Pines S.H., Organic Chemistry, (4th edition) New Delhi, Mc Graw - Hill International Book company .(1986)
3. Seyhan N. Ege., Organic Chemistry, New York, Houthton Mifflin Co., (2004)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
V	III	BCHF185T30	Physical Chemistry -I	4	0	1	5

**Aim:**

- To study the laws of thermodynamics and applications.
- To study about the colligative properties of solutions.

**Objective**

- To understand the basics of Thermodynamics.
- To understand the importance of Thermodynamics & their applications in day to day life.

**Outcome:**

Students get knowledge about various laws of thermodynamic and the laws governing the behavior of solutions

**Unit I: Thermodynamics I****(15 hrs)**

Definition of thermodynamic terms: system and surroundings - types of systems, Intensive and extensive properties, Thermodynamic process, Concept of heat and work. First Law of thermodynamics: statement - internal energy - its evaluation in terms of rotational, translational and vibrational degrees of freedom for gaseous molecules, Enthalpy, Heat capacities of gases at constant volume and pressure and their relationship. Joule Thomson Effect, Joule-Thomson coefficient and inversion temp. Calculation of  $w$ ,  $q$ ,  $dE$  and  $dH$  for the reversible expansion of ideal gases under isothermal and adiabatic conditions.

**Unit II: Thermodynamics II****(15 hrs)**

Second Law of Thermodynamics - need for the law, Different statements of the law, Carnot cycle and its efficiency - Carnot's Theorem. Concept of entropy - entropy as a function of volume and temperature, Entropy as a function of P & T, Entropy change in physical changes - entropy as a criteria of spontaneity and equilibrium - entropy change in ideal gases and mixing of gases.

Standard states, Hess's Law of heat summation and its applications, Heat of reaction at constant pressure and at constant volume, Bond dissociation energy and its calculation, Temperature dependence of enthalpy, Kirchhoff's Equation.

**Unit III: Thermodynamics III****(15 hrs)**

Equilibrium constant and free energy change - thermodynamic derivation of law of mass action - equilibrium constants in terms of pressure and concentration -  $NH_3$ ,  $PCl_5$ ,  $CaCO_3$ . Thermodynamic interpretation of Le chatelier's principle (concentration, temperature, pressure and addition of inert gases.) systems with variable composition. Partial molar quantities - chemical potential - variation of chemical potential with T, P and X (mole fraction), 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, Evaluation of absolute entropy from heat capacity data. Exception to III law (ortho and para hydrogen, CO, N<sub>2</sub>O and ice).

**Unit IV: Solutions****(15 hrs)**

Concept of activity and activity coefficient, completely miscible liquid systems - benzene and toluene. Raoult's law and Henry's law, deviations. Duhem - Margules equation, theory of fractional distillation. azeotropes - HCl – water and ethanol - water systems - partially miscible liquid systems - phenol - water, tri ethanol amine - 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, 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. Determination of molecular masses using the above properties. abnormal colligative properties.

**Unit V: Thermodynamics of phase changes****(15 hrs)**

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 - (Ag-Au) - fractional crystallization. Freezing mixtures - FeCl<sub>3</sub> - H<sub>2</sub>O systems, CuSO<sub>4</sub>-H<sub>2</sub>O system.

**Text Books:**

1. Puri B.R., Sharma L.R., Pathania M.S. Principles of Physical Chemistry, (23rd edition), New Delhi, Shoban Lal, Nagin Chand & Co., (1993)
2. Rajaram and Kuriacose,, Thermodynamics for students of chemistry, Macmillan Publishers (1998)

**Reference Books:**

1. Atkins P.W., Physical Chemistry, (5th edition) Oxford University Press. (1994)
2. Castellan G.V. Physical Chemistry, New Delhi, Orient Longman. ( 2002 )

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
V	III	BCHF185SE1	Chemical Industries- Principles and Practices	1	0	1	1

**Aim:** Familiarizing the concepts industrial environment and industrial processes.

**Objective:**

- To introduce the concepts of functioning of an industry, various branches of it and safety management.

**Outcome:**

- Knowledge about the industrial principles and functioning of industries.

**Unit I: Introduction to industrial organization (5 hrs)**

Types of industries – chemical industries – types industrial – fine chemicals and pharmaceutical industries – importance – economic and ecological impacts. – general organizational structure – different departments – procurement – process – QC-QA – R&D - Marketing and HR departments and their roles. Working mode - hierarchy.

**Unit II: Safety and waste management in industries (5 hrs)**

Risk and hazard management - safety Vs production, risk assessment and analysis - analysis of hazard - Tackling disaster - plan of emergency - risk management routines- emergency shutdown systems -Role of computer in safety - prevention of hazard - human element, technology and process selection, design of safety audit system and disaster management. Importance of waste minimization –classification – housekeeping - process change-recycling - product modification - waste minimization methodology steps - benefits of waste minimization.

**Unit III: Chemical industries (5 hrs)**

Sugar industries: Major unit operation of sugar industry - Pollution problems - Paper & Pulp industry: Raw materials for pulp making, Kraft and Sulphite pulping methods, Pollution aspects - Textile Industry: Natural and synthetic fibers, Fiber properties important in textile production- Petro chemical Industries -Composition and characteristics - Petroleum exploration - enhanced oil recovery by water and steam injection -offshore drilling, Petroleum refining- reforming - desulphurization polymerization etc. Important refinery products or fractions.  
Report about industrial visit. (Every student has to submit the report after visiting the industry).

**Text Books:**

- G.T. Austin, Shreve's Chemical Process Industries, Mc Graw Hill
- Lees, F.P., Loss Prevention in Process Industries, Butterworths, NewDelhi, (1986)
- Krishnan N.V. Safety Management in Industry, Jaico Publishing House, Bombay, (1997)
- B.K.Sharma, Industrial chemistry, Goel publications

**Reference Books:**

- Dryden's Outlines of Chemical Technology, Edited by M. Gopala Rao, M. Sittig, Affiliated East-West Press Ltd.
- Accident Prevention Manual for Industrial Operations, NSC, Chicago, (1982)
- Blake R.B., Industrial Safety, Prentice Hall, Inc., New Jersey, (1973)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
V	III	BCHF185P40	Major Practical - III	-	5	-	5

### Major Practical III - (Gravimetric Analysis)

#### GRAVIMETRIC ANALYSIS

1. Estimation of Lead as lead chromate.
2. Estimation of Barium as barium chromate.
3. Estimation of Barium as barium sulphate.
4. Estimation of sulphate as barium sulphate.
5. Estimation of Barium as barium chromate.
6. Estimation of Calcium as Calcium carbonate.
7. Estimation of Calcium as Calcium oxalate.
8. Estimation of Nickel as Nickel-DMG.

#### Reference Books:

1. Venkateswaran V., Veerasamy R., Kulandaivelu A.R., Basic principles of practical Chemistry, 2<sup>nd</sup> edition, New Delhi, Sultan Chand & sons (1997)
2. R. Mukhopadhyay, P. Chatterjee., Advanced Practical Chemistry, 3<sup>rd</sup> edition, Arunabha Sen Books & Allied Pvt. Ltd. (2007)
3. Gurdeep Raj, Advanced Practical Inorganic Chemistry, 15<sup>th</sup> edition, (2001)

Scheme of Valuation	
Record	10 marks
Procedure Writing	20 marks
Experiment	30 marks
Calculation	20 marks
Results	10 marks
< 4 % - 10 marks	
6 % - 8 marks	
8 % - 6 marks	
10% - 4 marks	
> 10% - 2 marks	
Viva	10 marks
<b>Total</b>	<b>100 marks</b>

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
V	III	BCHF185P50	Major Practical - IV	0	5	0	5

### Organic Qualitative Analysis and Organic Preparation

#### ORGANIC ANALYSIS

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

#### ORGANIC PREPARATION:

Preparation of Organic Compounds (Any four)

1. Benzoic acid from benzaldehyde, 2. para-bromoacetanilide from acetanilide, 3. para-nitroacetanilide from acetanilide, 4. Phenylazo-2-naphthol from aniline, 5. Salicylic acid from methyl salicylate, 6. Osazone from glucose.

#### Reference Books:

1. N.S. Gnapragasam, G. Ramamurthy, Organic chemistry lab manual, 1<sup>st</sup> edition, S. Viswanathan printers and publishers Pvt. Ltd. (2006)
2. Jagmohan, Organic, Analytical chemistry, theory and practice. Narose publishing House.(2006)
3. Gnanaprakasam, Ramamurthy, Organic chemistry lab manual.
4. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons (1997)
5. R. Mukhopadhyay, P. Chatterjee., Advanced Practical Chemistry, 3<sup>rd</sup> edition, Arunabha Sen Books & Allied Pvt. Ltd. (2007)

Scheme of Valuation	
Record	10 marks
Org. preparation Crude sample (20 marks) Recrystallization (10 marks)	30 marks
Org. analysis	50 marks
Aromatic/ Aliphatic (05 marks)	
Sat/Unsat (05 marks)	
Elements (10 marks)	
Functional group (10 marks)	
Derivatives (10 marks) Procedure (20 marks)	
Viva	10 marks
<b>Total</b>	<b>100 marks</b>



**Semester-VI**

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
VI	III	BCHF186T10	Inorganic Chemistry -II	4	0	1	5

*Aim: To study about nuclear and magneto chemistry of inorganic compounds.*

**Objective:**

- To understand basic concepts of Nuclear and magnetic properties
- To familiarize some special types of inorganic compounds and their uses.

**Outcome:**

- Students get knowledge about the nuclear reactions, nature of radioactive elements and magnetic properties.
- To gain the knowledge about properties and applications of inorganic polymers.

**Unit I: Nuclear Chemistry – I****(15 hrs)**

Introduction - composition of nucleus and nuclear forces (meson field theory)- nuclear stability - mass defect - binding energy - packing fraction - N/P ratio, magic numbers - nuclear models - liquid drop - shell and collective model - Isotopes - detection and separation - deviation of atomic weights from whole numbers - isobars isotones and isomers.

**Unit II: Nuclear Chemistry - II****(15 hrs)**

Radioactivity – discovery, detection and measurements, laws of radioactivity - rate of disintegration - half life and average life, group displacement law - radioactive series - nuclear transformation - use of projectiles - nuclear reactions - fission and fusion - nuclear reactors, applications of nuclear science in agriculture and medicine- carbon dating - rock dating - radioactive waste disposal.

**Unit III: Some Special Type of Inorganic Compounds****(15 hrs)**

Binary compounds - hydrides, borides, carbides and nitrides - classification, preparation, properties and uses. some special classes of compounds - clathrates - examples and structures - Interstitial compounds. Composition, manufacture, structure properties and uses– silicates and their polymers - classification into discrete anions - one, two and three dimensional structures with examples - composition, properties and uses of beryl, asbestos, talc, mica, zeolites and ultramarines.

**Unit IV: Magnetic Properties of Chemical Compounds****(15 hrs)**

Types of magnetic behaviors of substances, magnetic susceptibility and its measurement (Gouy method), diamagnetic correction, effective magnetic moment. Curie and Curie-Weiss law. ferro, ferri and anti ferromagnetic behaviors-Neel temperature; sub-magnetic moments. Spin – orbit coupling Spin – only moment for 3d metals - Magnetic moments for rare - earth elements.

**Unit V: Inorganic Polymers****(15 hrs)**

General properties – phosphorous based chain polymers – phosphate glasses – Maddrell salt – Kuroll salt – Structure, properties and uses of Ultraphosphate glasses – boro phosphate glasses – Sulphur based polymers –  $(SN)_n$  – Chalcogenide glasses – silicon based polymers – silicones – co-ordination polymers –  $(AuSCN)_n$  –  $PdCl_2$ .

**Text Books:**

1. Puri, Sharma and Kalia, Principles of Inorganic Chemistry, Milestone publishers and distributors, (2010)
2. Asim. K. Das, Advanced Inorganic chemistry Vol – III, CBC Publisher (2012)
3. Gurdeep Raj, Advanced Inorganic Chemistry – Vol – I, Pragathi Prakashan, (2004)

**Reference Books:**

1. Soni P.L., Text book of Inorganic Chemistry, S. Chand & Co, New Delhi (2006)
2. Lee J.D., Concise Inorganic Chemistry ELBS edition (1996)
3. Satyaprakash, Tuli, G.D., Basu, S.K., and Madan, R.D, Advanced Inorganic chemistry (Vol. I & II) S. Chand, New Delhi (2006)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
VI	III	BCHF186T20	Organic Chemistry –II	4	0	1	5

**Aim:** To study about carbohydrates, proteins, vitamins and molecular rearrangements.

**Objective**

- To understand chemistry and importance of biomolecules, alkaloids and terpenoids.
- To familiarize the mechanism of molecular rearrangements.
- To learn the basics of stereo isomerism in organic compounds.

**Outcome:**

- Knowledge about isomerism, types of isomerism and stereochemistry.
- To get an idea about natural products.

**Unit I: Stereochemistry**

**(15 hrs)**

Concept of isomerism, Types of isomerism; Optical isomerism – elements of symmetry, molecular chirality, enantiomers, optical activity, properties of enantiomers, chiral and achiral molecules, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomer, inversion, retention and racemization. Cahn-Ingold-Prelog sequence rules: R, S system of nomenclature. Geometric isomerism: Determination of configuration of geometric isomers. Cis - trans and E-Z system of nomenclature. Geometric isomerism in oximes. Conformational isomerism – conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives, Newman projection and Sawhorse formulae, Fischer formulae, Difference between configuration and conformation. Conformational analysis of mono and disubstituted cyclohexane. Difference in reactivity of axial and equatorially substituted rings.

**Unit II: Molecular rearrangements**

**(15 hrs)**

Molecular rearrangements - types of rearrangement (nucleophilic and electrophilic) – mechanism with evidence for the following re-arrangements: pinacol - pinacolone, benzil - benzilic acid, benzidine, Claisen, Fries, Hofmann, Curtius, Beckmann, Schmidt and Cope.

**Unit III: Chemistry of carbohydrates**

**(15 hrs)**

Carbohydrates - classification, properties of mono saccharide (glucose and fructose), structure and configuration of mono saccharide, interconversion, ascending and descending series, mutarotation, epimerisation- cyclic structure - determination of size of sugar rings - disaccharide - sucrose, maltose - structure elucidation - polysaccharide - starch and cellulose (elementary treatment)- Amadori rearrangement.

**Unit IV: Chemistry of proteins and vitamins**

**(15 hrs)**

Amino acids - classification, general methods of preparation and reactions of amino acids, zwitter ion - isoelectric points, action of heat on  $\alpha$ ,  $\beta$  and  $\gamma$  amino acids. Peptides and proteins - Peptide linkage - polypeptide - classification of proteins - synthesis of peptides - Merrifield

synthesis - primary structure - end group analysis – Sanger's method - Dansyl chloride, Edmund method - secondary structure - tertiary structure - denaturation - colour reactions of proteins.

**Vitamins (structural elucidation not needed)** – classification - sources and biological importance of vitamins A, B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, B<sub>12</sub> and C.

**Unit V: Chemistry of alkaloids and terpenoids (15 hrs)**

Chemistry of natural products - alkaloids - isolation, classification, general methods of elucidating structure - structural elucidation and synthesis of coniine, piperine, nicotine.

**Terpenes** - classification - isoprene, special isoprene rule, general methods of structural elucidation - structural elucidation and synthesis of citral, limonene, menthol.

**Text Books:**

1. Bahl B.S, Arun Bahl, Advanced Organic Chemistry, (12th edition) New Delhi, Sultam Chand and Co., (1986)
2. Morrison R.T., Boyd R.N., Organic Chemistry, (6th edition) New York, Allyn & Bacon Ltd., (2006)
3. K.S Tewari., N.K Vishnoi., A Text book of Organic Chemistry, (3<sup>rd</sup> edition) Vikas Publishing House PVT Ltd., (2006)

**Reference Books:**

1. Finar I.L., Organic Chemistry, Vol 1&2, (6th edition) England, Addison Wesley Longman Ltd. (1996)
2. Pine S.H., Organic Chemistry, (4th edition) New Delhi, McGraw – Hill International Book Company (1986)
3. Seyhan N. Ege, Organic Chemistry, New York, Houghton Mifflin Co., (2004)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
VI	III	BCHF186T30	Physical Chemistry - II	4	0	1	5

**Aim:** To study about electrochemistry, photochemistry and surface phenomena.

**Objective:**

- To learn about the principles and applications of electrochemistry
- To learn about the principles of photochemistry

**Outcome:**

- Students get knowledge about titrations without using indicator.
- Gets an idea about photochemistry, group theory and surface phenomena.

**Unit I: Electrolytic conductance**

**(15 hrs)**

Electrical transport and conductance in metal and in electrolytic solution - specific conductance and equivalent conductance. Measurement of equivalent conductance using Kohlraush's bridge. Arrhenius theory of electrolytic dissociation and its limitation. Weak and strong electrolytes according to Arrhenius theory. Ostwald's dilution law - applications and limitations. Variation of equivalent conductance with concentration - migration of ions- ionic mobility. Kohlrausch's law and its applications. The elementary treatment of the Debye – Huckel- Onsager equation for strong electrolytes (No derivation). Evidence for ionic atmosphere -Wien effect -Debye - Falkenhagen effect.Application of conductance measurements – Determination of  $k_a$  of acids ,Determination of solubility product of a sparingly soluble salt ,Conductometric titrations.

**Unit II : Electrochemical Cells – I**

**(15 hrs)**

Types of reversible electrodes - gas/metal ion - metal/metal ion; metal/insoluble salt/ anion and redox electrodes. electrode reactions - Nernst equation – derivation of cell, E.M.F and single electrode potential, Standard hydrogen electrode, Reference electrodes, Standard electrode potentials - sign convention - electrochemical series and its significance. Determination of pH using hydrogen and quinhydrone electrodes.

**Unit III : Electrochemical Cells-II**

**(15 hrs)**

Electrolytic & galvanic cells - reversible and irreversible cells. Conventional representation of electrochemical cells. Electromotive force of a cell and its measurement- computation of E.M.F- calculation of thermodynamic quantities of cell reactions ( $\Delta G$ ,  $\Delta H$ ,  $\Delta S$  and  $K$ ), Application of Gibbs Helmholtz equation. Concentration cell and E.M.F- Nernst equation, 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.

**Unit IV: Photo chemistry**

**(15 hrs)**

Consequences of light absorption - Jablonski diagram- radiative and non – radiative transitions. laws of photo chemistry - Grothus - Draper and Stark – Einstein laws. quantum efficiency -

comparison between thermal and photochemical reactions. Photo sensitization and quenching- Sternn-Volmer equation. Fluorescence, Phosphorescence and Chemiluminescence - definition and examples only

**Unit V: Surface Phenomena****(15 hrs)**

Adsorption - Physisorption and chemisorptions - Freundlich adsorption isotherm - Langmuir adsorption isotherm - BET equation (no derivation) - applications of adsorption. Catalysis: - definition - homogeneous catalysis, Function of a catalyst in terms of Gibbs free energy of activation, Heterogeneous catalysis. Kinetics of unimolecular surface reactions, Theories of catalysis – Intermediate compound formation theory, Adsorption theory. Enzyme catalysis. — explanation with suitable examples, Michaelis–Menten equation.

**Text Books**

1. Puri B.R., Sharma L.R., and Pathania B.K., Principles of Physical Chemistry, Vishal publishing company (2008)
2. K.K.Rohtagi-Mukherjee, Fundamentals of Photochemistry, New Age International Publishers, 1978, revised edition (2002)

**Reference Books**

1. C.N.Banwell & Elaine McCash, Tata, Fundamentals of Molecular Spectroscopy, Fourth edition, McGraw- Hill Publishing Co.Ltd., (1994)
2. An Introduction to Electrochemistry, First edition, Samuel Glasstone, Affiliated East West Press Private Ltd. 1942. reprint (1999)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
VI	IV	BCHF186T60	Pharmaceutical Chemistry	1	0	1	1

**Aim:** To acquire the knowledge about Analgesics, Antiseptics and disinfectants

**Objective:**

- To make the student to acquire the sound knowledge and understanding of pharmaceutical chemistry.

**Outcome:**

- A sound knowledge about basics of pharmaceuticals and various types of medicines

### Unit I: Introduction to Pharmaceutical chemistry (5 hrs)

Pharmacy and pharmaceutical chemistry as a career, important aspects of pharmaceutical chemistry, important terminologies used in pharmaceutical chemistry, Importance of chemistry in pharmacy, pharmacopoeia (BP, IP, USP), National formulary, pharmaceuticals, vaccines, toxoids, primary immunization, additive effect, synergism, antagonism, placebo, LD<sub>50</sub>, ED<sub>50</sub> and therapeutic index.

### Unit II: Drug assimilation and onset of action (5 hrs)

**Pharmacokinetics:** Introduction to drug absorption, disposition, elimination using Pharmacokinetics, important pharmacokinetic parameters in defining drug disposition and in therapeutics. Mention of uses of pharmacokinetics in drug development process.

**Pharmacodynamics:** Introduction, elementary treatment of enzyme stimulation, enzyme inhibition, sulphonamides, membrane active drugs, drug metabolism, xenobiotics, biotransformation, significance of drug metabolism in medicinal chemistry.

### Unit III: Common types of drugs and their applications (5 hrs)

**Antibiotics:** definition - structure, assay and uses of chloramphenicol and penicillin-industrial preparation-structure and use of streptomycin and tetracyclines.

**Antiseptics and disinfectants:** Definition and distinction- phenol coefficient- examples- phenolic compounds, dyes, cationic surfactants and chlorophenols.

**Anesthetics** – Definition –Classification –volatile anesthetics (N<sub>2</sub>O, chloroform, halothane)-Ferguson principle –local anesthetics preparation and uses of procaine orthocaine and benzocaine.

**Analgesics**-definition classification- different types of pain– morphine-pethidine and methadone-antipyretic analgesics-paracetamol, phenacetin –Ibuprofen.

#### Text book

1. Jayashree Ghosh. Textbook of Pharmaceutical Chemistry. S Chand & Co Ltd, (2012)
2. Laxmi. Textbook of Pharmaceutical Chemistry, S Chand & Co Ltd, (2000)

#### Reference books

1. Cairns Donald, Essentials of Pharmaceutical Chemistry. Pharmaceutical Press, (2012)
2. Bentley.A.O, Driver.J.E, Atherden.L.M, Bentley and Driver's textbook of pharmaceutical chemistry, Oxford University Press, (2010)

Semester	Part	Sub. Code	Title of the Paper	L	P	T	Credits
VI	III	BCHF186P40	Major Practical –V Physical Chemistry lab	0	5	0	5

### MAJOR PRACTICAL V – PHYSICAL CHEMISTRY PRACTICALS

#### LIST OF EXPERIMENTS:

1. Critical Solution Temperature of Phenol – water system
2. Effect of impurity on Critical solution Temperature
3. Transition Temperature of a salt hydrate.
4. Rast's Method determination of molecular weight of a non-volatile solute
5. Phase Diagram (Simple eutectic system)
6. Kinetics of Ester Hydrolysis – acid catalyzed hydrolysis of ethyl acetate
7. Kinetics of reaction between  $K_2S_2O_8$  and KI – clock reaction method
8. Conductometric Acid-Base Titration
9. Potentiometric Redox Titration
10. Determination of cell constant

#### Reference Books:

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons (1997)
2. R.Mukhopadhyay, P.Chatterjee., Advanced Practical Chemistry, 3<sup>rd</sup> edition, Arunabha Sen Books & Allied Pvt, Ltd. (2007)
3. A Finlay and J.A.Kitchener, Practical Physical Chemistry, Longman (1973)
4. F.Daniels and J.H.Mathews, Experimental Physical Chemistry, Longman (1985)

Scheme of Valuation	
Record	10 marks
Procedure Writing	20 marks
Experiment	30 marks
Calculation and Graph	20 marks
Result	10 marks
Viva	10 marks
<b>Total</b>	<b>100 marks</b>