

## ANNEXURE 18B03

### V.V. VANNIAPERUMAL COLLEGE FOR WOMEN



(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

*Re-accredited with 'A' Grade (3<sup>rd</sup> Cycle) by NAAC*

VIRUDHUNAGAR - 626 001

#### **CHOICE BASED CREDIT SYSTEM REGULATIONS AND SYLLABUS (with effect from Academic Year 2018 - 2019)**

V.V. Vanniaperumal College for Women, Virudhunagar, established in 1962, offers 19 UG Programmes, 14 PG Programmes, 6 M.Phil. Programmes and 3 Ph.D. Programmes. All these programmes, except Ph.D. Programmes, have been framed as per the guidelines given by UGC under Choice Based Credit System (CBCS).

The Departments of Commerce, English and History upgraded as Research Centres offer Ph.D. Programmes as per the norms and regulations of Madurai Kamaraj University, Madurai and do not come under the purview of CBCS.

#### **CHOICE BASED CREDIT SYSTEM (CBCS)**

The CBCS provides an opportunity for the students to choose courses from the prescribed Courses. The CBCS is followed as per the guidelines formulated by the UGC. The Students' performance will be evaluated based on the uniform grading system. Computation of the Cumulative Grade Point Average (CGPA) is made to ensure uniformity in evaluation system.

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#### **List of Programmes in which CBCS/Elective Course System is implemented**

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##### **UG PROGRAMMES**

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|--------------------------|---|--|
| Arts & Humanities        | : | History (E.M. & T.M.), English and Tamil   |
| Physical & Life Sciences | : | Mathematics, Zoology, Chemistry, Physics, Biochemistry, Home Science - Nutrition and Dietetics, Costume Design and Fashion, Microbiology, Biotechnology, Computer Science, Information Technology and Computer Applications. |
| Commerce & Management    | : | Commerce, Commerce with Computer Applications, Commerce with Professional Accounting Business Administration.  |

## PG PROGRAMMES

Arts & Humanities	:	History, English, Tamil
Physical & Life Sciences	:	Mathematics, Physics, Biochemistry, Food Processing & Quality Control, Chemistry, Zoology, Computer Science, Information Technology, Computer Applications (MCA*)
Commerce & Management	:	Commerce, Business Administration (MBA*)

\* AICTE approved Programmes

## PRE-DOCTORAL PROGRAMMES (M.Phil.)

Arts & Humanities	:	History, English, Tamil
Physical & Life Sciences	:	Mathematics, Biochemistry
Commerce & Management	:	Commerce

## OUTLINE OF CHOICE BASED CREDIT SYSTEM

1. Core Courses
2. Elective Courses
  - 2.1. Discipline Specific Elective Courses (DSEC)
  - 2.2. Dissertation / Project
3. Non Major Elective Courses (NMEC)
4. Generic Elective Courses (GEC)
5. Ability Enhancement Courses (AEC)
  - 5.1 Ability Enhancement Compulsory Courses (AECC)
  - 5.2. Skill Enhancement Courses (SEC)

**List of Non Major Elective Courses (NMEC) Offered**

**UG PROGRAMMES**

<b>Name of the Course</b>	<b>Semester</b>	<b>Department</b>
History of India upto A.D.1858	III	History(EM)
இந்திய வரலாறு கி.பி. 1858 வரை	III	History (TM)
Indian National Movement (A.D 1885-1947)	IV	History(EM)
இந்திய தேசிய இயக்கம் (கி.பி. 1885 – 1947)	IV	History(TM)
English for Professions I	III	English
English for Professions II	IV	
இக்காலநீதி இலக்கியம்	III	Tamil
உரைநடை இலக்கியம்	IV	
Basic Hindi - I	III	Hindi
Basic Hindi - II	IV	
Practical Banking	III	Commerce
Basic Accounting Principles	IV	
Business Management	III	Business Administration
Entrepreneurship	IV	
Quantitative Aptitude – I	III	Mathematics
Statistics and Operation Research	IV	
Physics in Everyday life	III	Physics
Fundamentals of Electronics	IV	
Industrial Chemistry	III	Chemistry
Drugs and Natural Products	IV	
Applied Zoology	III	Zoology
Animal Science	IV	
Basic Food Science	III	Home Science – Nutrition and Dietetics
Basic Nutrition and Dietetics	IV	
Women and Health	III	Biochemistry
Life style associated disorders	IV	
Medical Lab Technology	III	Microbiology
Applied Microbiology	IV	
Infectious Diseases	III	Biotechnology
Organic Farming	IV	
Basics of Fashion	III	Costume Design And Fashion
Interior Designing	IV	
Introduction to Computers and Office Automation	III	Computer Science
Introduction to Internet and HTML 5	IV	
Computer Fundamentals and E-mail	III	Information Technology
Introduction to HTML	IV	
Fundamentals of Computers	III	Computer Applications
Web Design with HTML	IV	
Horticulture – I	III	Botany
Horticulture – II	IV	
மருத்துவ தாவரவியல் - I	III	
மருத்துவ தாவரவியல் - II	IV	
Library and Information Science – I	III	Library Science
Library and Information Science - II	IV	

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## List of Generic Elective Courses (GEC) Offered

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### GENERIC ELECTIVE COURSES – 1

1. Human Rights/
2. Women Studies

### GENERIC ELECTIVE COURSES – 2

1. Constitution of India/
2. Modern Economics/
3. Adolescent Psychology/
4. Disaster Management

### ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

1. Environmental Studies
2. Value Education

மேல்நிலைக் கல்வி வரை தமிழை முதன்மைப் பாடமாக எடுத்துப் படிக்காத மாணவிகள் கீழ்க்கண்ட பாடங்களைக் கட்டாயம் படிக்க வேண்டும்.

- a) அடிப்படை தமிழ் -எழுத்தறிதல்
- b) அடிப்படைத் தமிழ் -மொழித்திறனறிதல்

### ELIGIBILITY FOR ADMISSION

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Tamilnadu or any other equivalent Examination accepted by Academic Council with Mathematics/Botany as one of the subjects in Higher Secondary Course.

### DURATION OF THE PROGRAMME

The candidates shall undergo the prescribed Programme of study for a period of three academic years (six semesters).

### MEDIUM OF INSTRUCTION

English

**COURSES OFFERED**

- Part I : Tamil/Hindi
- Part II : English
- Part-III : Core Courses  
 Elective Courses: Discipline Specific Electives Courses  
 Field Project  
 Allied Courses: 1. Mathematics /Botany  
 2. Physics
- Part IV : Non-Major Elective Courses (NMEC)  
 Generic Elective Courses (GEC)  
 Ability Enhancement Compulsory Courses (AECC)  
 Skill Enhancement Courses (SEC)
- Part V : National Service Scheme, Physical Education, Youth Red Cross Society, Red Ribbon Club, Science Forum, Eco Club, Library and Information Science, Consumer Forum, Health and Fitness Club, National Cadet Corps

Study Tour/ Field visit is mandatory for UG students.

Internship / Field Project is compulsory for II year UG Science students

**Internship:** A designated activity that carries one credit involving more than 7 days of working in an organization under the guidance of an identified mentor

**Field Project:** Project students comprising of maximum 5 members in a team need to undertake project that involve conducting surveys inside/outside the college premises and collection of data from designated communities or natural places.

**EVALUATION SCHEME**

Components	Internal Assessment Marks	External Examination Marks	Total Marks
Theory	25	75	100
Practical	40	60	100
Project	40	60	100

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**PART III - Core Courses, Discipline Specific Elective Courses & Allied Courses**


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**INTERNAL ASSESSMENT****Distribution of Marks****Theory**

Mode of Evaluation		Marks
Periodic Test	:	15
Assignment	:	5
Quiz	:	5
<b>Total</b>	<b>:</b>	<b>25</b>

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Best of the two will be considered

Three Quiz Tests - Best of the three will be considered

**Practical**

Mode of Evaluation		Marks
Model Test	:	30
Performance	:	10
<b>Total</b>	<b>:</b>	<b>40</b>

Two Model Tests - Best one will be considered

Performance - Attendance and Record

**Question Pattern for Periodic Tests****Duration: 2 Hours**

Section	Type of Question	No. of Questions	No. of Questions to be answered	Marks for each question	Total Marks
A Q. No.(1- 4)	Multiple choice	4	4	1	4
B Q. No.(5 - 7)	Either or type	3	3	7	21
C Q. No.(8-10)	Open Choice	3	2	10	20
<b>Total</b>					<b>45</b>

**EXTERNAL EXAMINATION****Question Pattern****Duration: 3 Hours**

Section	Type of Question	No. of Questions	No. of Questions to be answered	Marks for each question	Total Marks
A Q. No.(1- 10)	Multiple choice (Atleast Two questions from each unit)	10	10	1	10
B Q. No.(11 -15)	Either or type (one set from each unit)	5	5	7	35
C Q. No.(16-20)	Open Choice (one from each unit)	5	3	10	30
<b>Total</b>					<b>75</b>

**CORE COURSES ASSESSMENT**

Online Test will be conducted for the Core Courses in V & VI Semester.

Multiple Choice question Pattern will be followed.

**PART IV - Skill Enhancement Courses and Non Major Elective Courses****INTERNAL ASSESSMENT****Distribution of Marks****Theory**

Mode of Evaluation		Marks
Periodic Test	:	25
Assignment	:	10
Quiz	:	5
<b>Total</b>	:	<b>40</b>

Three Periodic tests - Average of the best two will be considered

Two Assignments - Best of the two will be considered

Three Quiz Tests - Best of the three will be considered

**Question Pattern****Duration: 1 Hour**

Section	Type of Question	No. of Questions	No. of Questions to be answered	Mark for each Question	Total Marks
A Q. No.(1- 4)	Open Choice	4	3	5	15
B Q. No.(5- 6)	Open Choice	2	1	10	10
<b>Total</b>					<b>25</b>

**EXTERNAL EXAMINATION****Question Pattern****Duration: 2 Hours**

Section	Type of Question	No. of Questions	No. of Questions to be answered	Mark for each Question	Total Marks
A Q. No.(1- 8)	Open Choice	8	6	5	30
B Q. No.(9- 13)	Open Choice	5	3	10	30
<b>Total</b>					<b>60</b>

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**PART IV- Generic Elective Courses and Ability Enhancement Compulsory Courses**


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- Assessment by Internal Examiner only
- Model Examination is conducted after two periodic tests.
- Book and Study Material prepared by the Faculty Members of the respective departments will be prescribed.

**ASSESSMENT PATTERN**

Mode of Evaluation		Marks
Periodic Test	:	30
Assignment	:	10
Model Examination	:	60
<b>Total</b>	<b>:</b>	<b>100</b>

Two Periodic tests - Best of the two will be considered

Two Assignments - Best of the two will be considered



**Question Pattern for Periodic Test****Duration: 1 Hour**

Section	Type of Question	No. of Questions	No. of Questions to be answered	Mark for each Question	Total Marks
A Q. No.(1- 4)	Open Choice	4	3	6	18
B Q. No.(5- 6)	Open Choice	2	1	12	12
<b>Total</b>					<b>30</b>

**Question Pattern for Model Examination****Duration: 2 Hours**

Section	Type of Question	No. of Questions	No. of Questions to be answered	Mark for each Question	Total Marks
A Q. No.(1- 8)	Open Choice	8	5	6	30
B Q. No.(9- 13)	Open Choice	5	3	10	30
<b>Total</b>					<b>60</b>

## **ELIGIBILITY FOR THE DEGREE**

- i) The candidate will not be eligible for degree without completing the prescribed Courses of study and a minimum Pass marks in all the Courses.
- ii) Attendance, progress and conduct certification from the Head of the Institution will be required for the students to write the examination.
  - No Pass minimum for Internal Assessment.
  - Pass minimum for External Examination is 27 marks out of 75 marks for Core Courses, Allied Courses and Discipline Specific Elective Courses.
  - Pass minimum for External Examination is 21 marks out of 60 marks for Non Major Elective Courses and Skill Enhancement Courses.
  - The aggregate minimum pass percentage is 40.
  - Pass minimum for External Practical Examination is 21 marks out of 60 marks.
  - Pass minimum for Generic Elective Course and Ability Enhancement Compulsory Course is 40.

**BACHELOR OF CHEMISTRY**  
**PROGRAM CODE -2017**

**PROGRAMME OUTCOMES**

**The students will be able to**

- get an in-depth understanding of the subject.
- develop an effective oral and written communication.
- have wider social mobility into reality.
- outsource the acquired knowledge with social concern and responsibility.
- have a wholesome personality by imbibing ethical and traditional values.
- strengthen the passion for learning with vigour and self-motivation.

**PROGRAMME SPECIFIC OUTCOMES**

**Students of Under Graduate Chemistry Programme will be able to**

PSO 1: obtain chemical knowledge concerning the fundamentals in the basic areas of Organic, Inorganic, Analytical, Physical and Biological Chemistry.

PSO 2: comprehend the structural difference among solids, liquids, gases and solutions.

PSO 3: understand the importance of physical chemistry in the areas of atomic structure, magnetic properties, solid state, thermodynamics, phase rule, chemical kinetics and photochemistry.

PSO 4: appreciate the potential of inorganic chemistry in the sections of elements of periodictable, coordination chemistry, types of bonding and bio inorganic chemistry.

PSO 5: validate the multiple utility of chemistry in the regions of medicinal chemistry, food chemistry and polymer chemistry.

PSO 6: acquire the analytical skills in conducting experiments in the areas of inorganic, organic and physical chemistry.

PSO 7: comprehend the proper procedures and regulations for safe handling and use of chemical, standard laboratory equipments, modern instrumentation and classical techniques to carry out experiments.

PSO 8: use computers in data acquisition, processing and use available software as a tool in dataanalysis.

PSO 9: develop professional, ethical, environmental and social responsibilites.

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### PART – I-TAMIL

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UTAG11	தாள்: 1 பொதுத்தமிழ்	3	100
2.	II	18UTAG21	தாள்: 2 பொதுத்தமிழ்	3	100
3.	III	18UTAG31	தாள்: 3 பொதுத்தமிழ்	3	100
4.	IV	18UTAG41	தாள்: 4 பொதுத்தமிழ்	3	100
<b>Total</b>				<b>12</b>	<b>400</b>

### PART I -HINDI

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UHDG11	Prose – I & II, Ancient Stories - I, General Essays, Functional Hindi – I & Grammar	3	100
2.	II	18UHDG21	Drama, Ancient Stories - II, Letter Correspondence, Functional Hindi-II & Grammar	3	100
3.	III	18UHDG31	Ancient Poetry, Drama, Indian History, Hindi Grammar & Functional Hindi III	3	100
4.	IV	18UHDG41	Modern Poetry, Hindi Literary Essays, Letter Correspondence, Conversation & Functional Hindi IV	3	100
<b>Total</b>				<b>12</b>	<b>400</b>

### PART II

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UENG11A	English for Advanced Learners I	3	100
		18UENG11B	English for Career Guidance - I		
		18UENG11C	English for Communicative Competence-I		
2.	II	18UENG21A	English for Advanced Learners II	3	100
		18UENG21B	English for Career Guidance - II		
		18UENG21C	English for Communicative Competence - II		
3.	III	18UENG31A	English for Advanced Learners III	3	100
		18UENG31B	English for Career Guidance – III		
		18UENG31C	English for Communicative Competence - III		
4.	IV	18UENG41A	English for Advanced Learners IV	3	100
		18UENG41B	English for Career Guidance – IV		
		18UENG41C	English for Communicative Competence - IV		
<b>Total</b>				<b>12</b>	<b>400</b>

**PART III – CORE, DISCIPLINE SPECIFIC ELECTIVE COURSES**

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1	I	18UCHC11	Inorganic Chemistry-I	4	100
2	I	18UCHC12	Organic and Physical Chemistry	4	100
3	II	18UCHC21	Organic Chemistry-I	4	100
4	II	18UCHC22	Inorganic and Physical Chemistry	4	100
5	II	18UCHC21P	Core Practical- I Volumetric Analysis	2	100
6	III	18UCHC31	Inorganic,Organic and Physical Chemistry-I	5	100
7	IV	18UCHC41	Inorganic,Organic and Physical Chemistry-II	5	100
8	IV	18UCHC41P	Core Practical –II Inorganic Semi-micro Qualitative Analysis	2	100
9	V	18UCHC51	Organic Chemistry-II	4	100
10	V	18UCHC52	Inorganic Chemistry-II	4	100
11	V	18UCHC53	Physical Chemistry-I	4	100
12	V	18UCHE51 18UCHE52 18UCHE53	Discipline Specific Elective 1 (DSEC 1) 1. Analytical Methods and Introduction to Computers 2. Textile Chemistry 3. Agricultural Chemistry	4	100
13	V	18UCHO51	Online Assessment	1	50
14	VI	18UCHC61	Organic Chemistry-III	4	100
15	VI	18UCHC62	Physical Chemistry-II	4	100
16	VI	18UCHC63	Applied Chemistry	4	100
17	VI	18UCHE61 18UCHE62 18UCHE63	Discipline Specific Elective 2 (DSE 2) 1. Medicinal Chemistry 2. Material Chemistry and Biomolecules 3. Dairy Chemistry	4	100
18	VI	18UCHO61	Online Assessment	1	50
19	VI	18UCHC61P	Practical –III Gravimetric Analysis and Organic Preparation	3	100
20	VI	18UCHC62P	Practical –IV Organic Analysis and Estimation	3	100
21	VI	18UCHC63P	Practical –V Physical Chemistry Experiments	2	100
<b>Total</b>				<b>72</b>	<b>2000</b>

**PART III – ALLIED COURSE I- MATHEMATICS**

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UMTA11	Mathematics –I	4	100
2.	II	18UMTA21	Mathematics – II	3	100
		18UMTA22	Mathematics - III	3	100
<b>Total</b>				<b>10</b>	<b>300</b>

**PART III – ALLIED COURSE I- BOTANY**

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UBYA11	Taxonomy of Angiosperms and Medicinal Botany	4	100
2.	II	18UBYA21	Applied Botany	3	100
		18UBYA21P	Allied Botany Practicals	3	100
<b>Total</b>				<b>10</b>	<b>300</b>

**PART III - ALLIED COURSE II- PHYSICS**

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	III	18UPCA31	Allied Physics-I	4	100
2.	IV	18UPCA41	Allied Physics-II	4	100
	IV	18UPCA41P	Allied Physics Practical -I	2	100
<b>Total</b>				<b>10</b>	<b>300</b>

**PART IV -SKILL ENHANCEMENT COURSES**

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	II	18UCHS21	Polymer Chemistry	2	100
2.	III	18UCHS31	Food Chemistry	2	100
3.	IV	18UCHS41	Leather Chemistry	2	100
4.	V	18UCHS51P	Analysis of Oils/Fats & Water Practical	2	100
5.	V	18UCHS52	Nanotechnology	2	100
6.	VI	18UCHS61	Green Chemistry	2	100
<b>Total</b>				<b>12</b>	<b>600</b>

**PART IV –NON MAJOR ELECTIVE COURSES**

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	III	18UCHN31	Industrial Chemistry	2	100
2.	IV	18UCHN41	Drugs and Natural Products	2	100
<b>Total</b>				<b>4</b>	<b>200</b>

**PARTIV–GENERIC ELECTIVE AND ABILITY ENHANCEMENT  
COMPUSORY COURSES**

S.No.	Sem.	Code	Title of the Course	Credits	Marks
1.	I	18UGVE11	Value Education	2	100
2.	III	18UGHR31 18UGWS32	Human Rights Women studies	1	100
3.	IV	18UGE41	Constitution of India	1	100
4		18UGEM42	Modern Economics		
5		18UGEA43	Adolescent psychology		
6		18UGED44 18UGED44N	Disaster Management Disaster Management		
7		18UCHI41G	Internship/Field Project	1	100
8		PART V	Extension Activities	1	-
9	V	18UGES51	Environmental Studies	2	100
<b>TOTAL</b>				<b>8</b>	<b>500</b>

**PART –VEXTENSION ACTIVITIES**

S.No.	Sem.	Code	Title of the Course	Credit
1	I, II, III & IV	18UVNS1 18UVNS2	National Service Scheme	1
2		18UVPE1 18UVPE2	Physical Education	
3		18UVYR1 18UVYR2	Youth Red Cross Society	
4		18UVRR1	Red Ribbon Club	
5		18UVSF1	ScienceForum	
6		18UVEC1	Eco Club	
7		18UVLI1	Library and Information Science	
8		18UVCC1	Consumer Forum	
9		18UVHF1	Health and Fitness Club	
10		18UVNC1 18UVNC2	National Cadet Corps	



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### BACHELOR OF CHEMISTRY

Programme Code – 2017

Semester	Course Code	Courses	Hours per week	Credits	Total Marks		
					Int.	Ext.	
I	Part I	18UTAG11	Tamil/Hindi I	6	3	25	75
	Part II	18UENG11	English I	6	3	25	75
	Part III	18UCHC11	<b>Core Course -1</b> Inorganic Chemistry-I	4	4	25	75
		18UCHC12	<b>Core Course - 2</b> Organic and Physical Chemistry	4	4	25	75
		18UCHC21P	<b>Core Course</b> Practical – I Volumetric Analysis	2	-	-	-
		18UMTA11/ 18UBYA11 18UBYA21P	<b>Allied Course –I</b> Mathematics – I / Allied Botany-I Allied Botany Practical	6/4 2	4 -	25 -	75 -
	Part IV	18UGVE11	Value Education	2	2	40	60
	<b>TOTAL</b>			<b>30</b>	<b>20</b>	<b>600</b>	



Semester	Course Code	Courses	Hours per week	Credits	Total Marks		
					Int.	Ext.	
II	Part I	18UTAG21	Tamil /Hindi II	6	3	25	75
	Part II	18UENG21	English II	6	3	25	75
	Part III	18UCHC21	<b>Core Course - 3</b> Organic Chemistry-I	4	4	25	75
		18UCHC22	<b>Core Course - 4</b> Inorganic and Physical Chemistry	4	4	25	75
		18UCHC21P	<b>Core Course</b> Practical –I Volumetric Analysis	2	2	40	60
		18UMTA21/ 18UBYA21	<b>Allied Course –</b> Allied Mathematics - II / Allied Botany-II	3 /4	3/4	25	75
		18UMTA22/ 18UBYA21P	Allied Mathematics – III / Allied Botany Practicals	3/2	3/2	25/40	75/60
	Part IV	18UCHS21	<b>SEC -1</b> Polymer Chemistry	2	2	25	75
	<b>TOTAL</b>			<b>30</b>	<b>24</b>	<b>800</b>	

Semester	Course Code	Courses	Hours per week	Credits	Total Marks			
					Int.	Ext.		
III	Part I	18UTAG31	Tamil/ Hindi III	6	3	25	75	
	Part II	18UENG31	English III	6	3	25	75	
	Part III	18UCHC31	<b>Core Course -5</b> Inorganic, Organic and Physical Chemistry-I	5	5	25	75	
		18UCHC41P	<b>Core Course</b> Practical – 2 Inorganic Semi-micro Qualitative Analysis	2	-	-	-	
		18UPCA31 18UPCA41P	<b>Allied-Course -II</b> Allied Physics -I Allied Physics Practical	4 2	4 -	25 -	75 -	
	Part IV	18UCHS31	<b>SEC -2</b> Food Chemistry	2	2	40	60	
		18UCHN31	<b>NMEC-1</b> Industrial Chemistry	2	2	40	60	
	Part IV	18UGHR31/ 18UGWS32	<b>Generic Elective -1</b> 1. Human Rights/ 2. Women studies	0	1	40	60	
		18UGEC41/ 18UGEM42/ 18UGEA43/ 18UGED44 18UGED44N	<b>Generic Elective -2</b> Constitution of India/ Modern Economics/ Adolescent Psychology/ Disaster Management Disaster Management	1	-	-	-	
		<b>TOTAL</b>			<b>30</b>	<b>20</b>	<b>700</b>	

Semester	Course Code	Courses	Hours per week	Credits	Total Marks		
					Int.	Ext.	
IV	Part I	18UTAG41	Tamil /Hindi IV	6	3	25	75
	Part II	18UENG41	English IV	6	3	25	75
	Part III	18UCHC41	<b>Core Course - 6</b> Inorganic, Organic and Physical Chemistry-II	5	5	25	75
		18UCHC41P	<b>Core Course</b> Practical –2 Inorganic Semi -micro Qualitative Analysis	2	2	40	60
		18UPCA41 18UPCA41P	<b>Allied Course – II</b> Allied Physics -II Allied Physics Practical	4 2	4 2	25 40	75 60
	Part IV	18UCHS41	<b>SEC -3</b> Leather Chemistry	2	2	40	60
		18UCHN41	<b>NMEC-2</b> Drugs and Natural Products	2	2	40	60
		18UCHI41G	Internship/Field Project	0	1	100	-
			<b>Generic Elective -2</b>				
		18UGEC41/ 18UGEM42/ 18UGEA43/	Constitution of India/ Modern Economics/ Adolescent Psychology/	1	1	40	60
		18UGED44 18UGED44N	Disaster Management Disaster Management				
		Part V		Extension Activities	-	1	-
			<b>TOTAL</b>	<b>30</b>	<b>26</b>	<b>1000</b>	

Semester	Course Code	Courses	Hours per week	Credits	Total Marks		
					Int.	Ext.	
V	Part III	18UCHC51	<b>Core Course – 7</b> Organic Chemistry-II	4	4	25	75
		18UCHC52	<b>Core Course - 8</b> Inorganic Chemistry-II	4	4	25	75
		18UCHC53	<b>Core Course – 9</b> Physical Chemistry-I	4	4	25	75
		18UCHC61P	<b>Core Course</b> Practical - 3 Gravimetric Analysis and Organic Preparation	3	-	-	-
		18UCHC62P	<b>Core Course</b> Practical - 4 Organic Analysis and Estimation	3	-	-	-
		18UCHC63P	<b>Core Course</b> Practical -5 Physical Chemistry Experiments	2	-	-	-
		18UCHE51	<b>DSEC -1</b> 1.Analytical Methods and Introduction to Computers/ 2.Textile Chemistry 3. Agricultural Chemistry	4	4	25	75
		18UCHE52					
		18UCHE53					
	18UCHOL51	Online Assessment	-	1	50		
	Part IV	18UCHS51P	<b>SEC -4</b> Analysis of Oils/Fats & Water Practical	1T+1P	2	40	60
		18UCHS52	<b>SEC -5</b> Nanotechnology	2	2	40	60
		18UGES51	Environmental Studies	2	2	40	60
		<b>TOTAL</b>	<b>30</b>	<b>23</b>	<b>750</b>		

Semester	Course Code	Courses	Hours per week	Credits	Total Marks		
					Int.	Ext.	
VI	Part III	18UCHC61	<b>Core Course -10</b> Organic Chemistry-III	5	4	25	75
		18UCHC62	<b>Core Course -11</b> Physical Chemistry-II	5	4	25	75
		18UCHC63	<b>Core Course -12</b> Applied Chemistry	5	4	25	75
		18UCHC61P	<b>Core Course</b> Practical - 3 Gravimetric Analysis and Organic Preparation	3	3	40	60
		18UCHC62P	<b>Core Course</b> Practical - 4 Organic Analysis and Estimation	3	3	40	60
		18UCHC63P	<b>Core Course</b> Practical -5 Physical Chemistry Experiments	2	2	40	60
		18UCHE61 18UCHE62	<b>DSEC -2</b> 1.Medicinal Chemistry 2. Material Chemistry and Biomolecules	5	4	25	75
		18UCHE63	3. Dairy Chemistry				
			18UCHOL61	Online Assessment	-	1	50
		Part IV	18UCHS61	<b>SEC -6</b> Green Chemistry	2	2	40
<b>TOTAL</b>			<b>30</b>	<b>27</b>	<b>850</b>		



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VIRUDHUNAGAR - 626 001

### B.Sc. CHEMISTRY(SEMESTER)

(For those who join in 2018-2019 and after)

Semester V	<b>ORGANIC CHEMISTRY-II</b>	Hours/Week: 4	
Core Course-7		Credits: 4	
Course Code <b>18UCHC51</b>		Internal 25	External 75

### COURSE OUTCOMES

On completion of the course, the students will be able to

- acquire basic knowledge about aromatic compounds.
- empower the knowledge of chemistry of aromatic halogen compounds, phenols, aromatic alcohols and ethers
- know the importance of aromatic aldehydes, ketones and acids
- comprehend about organosulphur and aromatic nitrogen compounds
- explore the chemistry of polynuclear hydrocarbons
- gain knowledge on heterocyclics

### UNIT I Aromaticity

- i) Aromatic compounds - Introduction – Nomenclature-General characteristics of aromatic compounds – aromaticity and Huckel rule – structure of benzene – MO approach-resonance - condition and effects of resonance- resonance energy-application to benzene
- ii) Mechanism of aromatic electrophilic substitution –Halogenation, nitration, sulphonation & Friedel – Crafts reaction.
- iii) Orientation in mono-substituted-Directive influence of substituents based on electronic effects
- iv) Introduction of a third substituent into the benzene ring- rules.

(12 Hours)

## UNIT II

### Aromatic halogen compounds, Phenols, Aromatic alcohols and Aromatic ethers

i) **Aromatic halogen compounds:** Aryl halides-preparation by Hunsdiecker reaction-properties –aromatic nucleophilic substitution reaction-mechanism of bimolecular nucleophilic substitution (S<sub>N</sub>Ar)-Benzyne mechanism-Preparation and uses of DDT and benzene hexachloride

ii) **Phenols:**a) Manufacture of phenol from coal tar – Acidity of phenol – effect of substituents on the acidity of phenol – Mechanism of electrophilic substitution reaction – Kolbe's reaction and Reimer - Tiemann reaction. Miscellaneous reactions - Lederer Manasse reaction & Elb's persulphate oxidation – estimation of phenol.

b) Preparation, properties & uses of dihydric and trihydric phenols

iii) **Aromatic alcohols:** Benzyl alcohol-distinction between phenol and benzyl alcohol

iv) **Aromatic ethers:** Preparation, properties & uses of anisole and phenetole

(12Hours)

## UNIT III

### Aromatic aldehydes, ketones and Acids

#### i) Aromatic aldehydes and ketones

a) Benzaldehyde – preparation- Sommelet reaction – Benzoin, Cannizzaro, Perkin, Knoevenagel and Claisen reactions with mechanism – uses of benzaldehyde.

b) Properties & uses of cinnamaldehyde and salicylaldehyde – vanillin – preparation from Eugenol – properties & uses.

c) Phenolic ketone : phloracetophenone – preparation by Houben – Hoesch synthesis. Preparation & uses of phenacyl bromide, Michler's ketone and dypnone

#### ii) Aromatic Acids:

a) Effect of substituents on acidic character.

b) Substituted acids:

Aminobenzoic acid: Anthranilic acid – preparation.

Phenolic acid: Salicylic acid- preparation from anthranilic acid – preparation of

oil of winter green, salol and aspirin from salicylic acid.

c) Dicarboxylic acid: Isomerism- Preparation and properties of phthalic acid.

Acid derivatives – preparation and properties of phthalic anhydride and phthalimide.

d) Side chain carboxylic acids: - preparation and properties of phenylacetic acid and

mandelic acid

(12Hours)

#### UNIT IV

##### Organosulphur compounds and aromatic nitrogen compounds

i) **Aromatic sulphonic acids:**Preparation and properties of benzene sulphonic acid-  
preparation of saccharin, chloramines-T and dichloramine-T

ii) **Aromatic nitro compounds:**Reduction of nitrobenzene under different conditions–  
nitrotoluenes-preparation, properties and uses – TNT – Preparation & Uses

iii) **Aromatic amines:**Aniline –basicity of aniline- effect of substituents on basicity –  
reactions – carbylamine reaction and diazotization with mechanism – condensation  
with aldehyde – distinction between aliphatic and aromatic amines-Estimation of  
aniline-preparation and uses of sulphanilic acid,nitroanilines,toluidines and phenylene  
diamines

iv) **Aromatic diazonium salts:**Preparation and synthetic applications of benzene  
diazonium chloride

v) **Aromatic amide:** Benzamide –reaction with alkyl halide-hydrolysis (12Hours)

#### UNIT V

##### Polynuclear hydrocarbons and Heterocyclic Compounds:

i) **Polynuclear hydrocarbons:**

Isolated systems:Preparation and properties of diphenyl, diphenyl methane and stilbene.

Condensed systems: Preparation, properties and uses of naphthalene, naphthylamines,  
naphthols, naphthaquinones, anthracene, anthraquinone and phenantherene.

ii) **Heterocyclic Compounds:**Introduction - nomenclature - comparison of aromatic  
character of furan, thiophene and pyrrole with benzene - comparison of basicities of  
pyrrole, pyridine and piperidine with amines. Synthesis of quinoline, isoquinoline and  
indole with special reference to Skraup, Bischler - Napieralski and Fischer-Indole synthesis



respectively – Reactions of quinoline, isoquinoline and indole – Chemistry of imidazole, Oxazole, thiazole, pyrimidine and Purine. (12Hours)

### TEXT BOOKS

1. Arun Bahl & Bahl, B.S. (2012). *Advanced Organic Chemistry*. 19<sup>th</sup> Edition. New Delhi: S.Chand & Company Ltd.
2. Tewari, K.S. & Vishnoi, N.K. (2006). *A Text book of Organic Chemistry*. 3<sup>rd</sup> Edition. New Delhi: Vikas Publishing House Pvt. Ltd.

### REFERENCE BOOKS

1. Finar, I.L. (2006). *Organic Chemistry*. 6<sup>th</sup> Edition. Singapore: Pearson Education Pvt. Ltd. Volume –I.
2. Soni, P.L. (2008). *Text Book of Organic Chemistry*. 2<sup>nd</sup> Edition. New Delhi: SultanChand & Sons.

Mrs.A.Prasanna  
Mrs.R.Nagasathya  
Course Designers



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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester V	<b>INORGANIC CHEMISTRY-II</b>	Hours/Week: 4	
Core Course-8		Credits: 4	
Course Code <b>18UCHC52</b>		Internal 25	External 75

### COURSE OUTCOMES

On completion of the course, the students will be able to

- understand the basic concepts of coordination chemistry
- empower the knowledge of organometallic compounds
- enrich the chemistry of inorganic polymers.
- know the importance of the inner – transition elements
- explore the chemistry of acids, bases and non aqueous solvents.
- gain knowledge on the role of elements in biology

### UNIT I

#### Coordination Compounds:

- a. Introduction – Nomenclature – isomerism in complexes – geometrical and optical – Werner's theory – Sidgwick theory – EAN rule – Valence bond theory – low spin and high spin complexes – magnetic properties – limitations of VB theory – Crystal field theory – Octahedral and square planar complexes – colour of coordination complexes – differences between VBT and CFT.
- b. Metallic carbonyls – bonding and structure of  $\text{Ni}(\text{CO})_4$ ,  $\text{Fe}(\text{CO})_5$ ,  $\text{Cr}(\text{CO})_6$ ,  $\text{Fe}_2(\text{CO})_9$  and  $\text{Co}_2(\text{CO})_8$ .
- c. Chelates – Chelation – application of chelate formation. (12Hours)

## UNIT II

### Organo metallic compounds

a. Introduction – definition, nomenclature, classification based on the nature of metal – carbon bond- ionic organometallic compounds- reactivity of  $\text{Na}^+(\text{CH}_2\text{C}_6\text{H}_5)$  and  $(\text{NaC}_6\text{H}_5)$ -Compounds containing metal-carbon sigma bonds- organometallic compounds of group III elements and group V elements –organo metallic compounds with multicentre bonds- $\text{Li}(\text{CH}_3)_4$ -Organometallic compounds with pi bonded ligands-ferrocene- aromatic character.

b. Inorganic polymers –Introduction-General properties-Glass transition temperature-Silicone based polymer-liquid polysiloxane-siloxane gums. (12Hours)

## UNIT III

### Inner – transition elements:

- a. **The lanthanide series** – Occurrence – properties :Electronic configuration, Oxidation states, ionic radii, lanthanide contraction, consequences, causes – colour, magnetic properties, Oxidation potential, basic character – solubility of compounds, double salts, complexes – extraction of lanthanides from monazite sand – separation of lanthanides :solvent extraction, cation exchange chromatography – uses of lanthanides.
- b. **The actinide series** – Sources, Transuranic elements – preparation – Electronic configuration – properties: Oxidation states – Ionic radii – colour of ions – formation of complexes – comparison of actinides with lanthanides. (12Hours)

## UNIT IV

### Acid-Base concepts

- a. Acids and bases – Bronsted – Lowry concept: Conjugate Acid – Base pairs, relative strengths of acids and bases – Lux – flood concept – limitations – Lowry concept – levelling effect – Usanovich concept – hard and soft acids – classification – HSAB theory – characteristics of hard and soft acids.
- b. Non – aqueous solvents: Classification of solvents – chemical reactions in liquid ammonia – protolysis – ammonolysis – complex formation – solution of alkali

metals in liquid  $\text{NH}_3$ . Reactions in liquid sulphur dioxide – precipitation reactions – complex formation reactions – Redox reactions. (12Hours)

## UNIT V

### Bioinorganic chemistry

- Introduction to bioinorganic chemistry -Metalloporphyrins -porphyrins –biological significance of chlorophyll – vitamin  $\text{B}_{12}$  (Structure not necessary)
- Myoglobin and hemoglobin – Their role in biological systems – Hill constant, cooperativity effect in hemoglobin.
- Metallo enzymes, apoenzymes, Co factors – function in biological systems – carbonic anhydrase – carboxypeptidase – Peroxidases – catalases – cytochrome P – 450
- Role of alkali and alkaline earth metal ions in biological systems – role of  $\text{Na}^+$  and  $\text{K}^+$  ions – Sodium pump – Role of  $\text{Mg}^{2+}$  and  $\text{Ca}^{2+}$  ions.
- Biological functions and toxicity of elements – chromium, cadmium, lead, mercury and Arsenic. (12Hours)

### TEXT BOOKS

- Soni, P.L. (2016). *Coordination Chemistry*. 1<sup>st</sup> Edition. New Delhi: Ane Books Pvt.Ltd.
- Puri, B.R. Sharma, L.R. & Kalia, K.C.(2014). *Principles of Inorganic Chemistry*, 32<sup>nd</sup> Edition. Delhi: Milestone Publishers.

### REFERENCE BOOKS

- Madan, R.D. (2018). *Modern Inorganic Chemistry*. 1<sup>st</sup> Edition. New Delhi: S.Chand and Company.Ltd.
- Sathya Prakash, Tuli, G.D., Basu, S.K. & Madan, R.D. (2008). *Advanced Inorganic Chemistry*. 1<sup>st</sup> Edition. Volume I, New Delhi: S.Chand & Company Ltd.
- Huheey, E. Keitler, A. & Keitler, L. (2006). *Inorganic Chemistry*. 4<sup>th</sup> Edition. New York: Dorling Kindersley Pvt. Ltd.
- Gopalan, R. & Ramalingam, V. (2003). *Concise Coordination Chemistry*. 1<sup>st</sup> Edition. New Delhi: Vikas Publishing House Pvt. Ltd.
- Hussain Reddy, K. (2017) *Bioinorganic Chemistry*, 1<sup>st</sup> Edition. New Delhi: New Age International Publishers Pvt. Ltd.

Mrs.M.Dhanalakshmi  
Dr.M.Amutha  
Course Designers



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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester V	<b>PHYSICAL CHEMISTRY-I</b>	Hours/Week: 4	
Core Course- 9		Credits: 4	
Course Code <b>18UCHC53</b>		Internal 25	External 75

#### COURSE OUTCOMES

On completion of the course, the students will be able to

- know about the thermodynamic terms – systems – surroundings, reversible and irreversible processes
- understand the second law of thermodynamics, concept of entropy and its applications
- know about the Third law of Thermodynamics
- know the reaction rates and pathways to understand the energy changes involved in chemical reactions
- know the various photochemical processes in the chemical systems

#### UNIT I

##### Thermodynamics – I:

a) System and surrounding – Isolated, closed and open system – state of the system – Intensive and extensive properties – Thermodynamic processes – reversible, irreversible, isothermal and adiabatic processes – State and path functions – Exact and Inexact differentials – Work of expansion at constant pressure and free expansion

b) First law of Thermodynamics – Statement – definition of internal energy, Enthalpy and Heat capacity – relation between  $C_p$  &  $C_v$  – calculation of  $w$ ,  $q$ ,  $dE$  and  $dH$

for expansion of ideal and real gases under isothermal and adiabatic conditions of reversible and irreversible processes – Definition of Joule-Thomson coefficient ( $\mu_{JT}$ ) – Calculation of  $\mu_{JT}$  for ideal and real gases – inversion temperature

c) Thermochemistry – temperature dependence of heat of reaction – Kirchoff's equation – Hess's law of heat summation – Bond enthalpies – Zeroth law of Thermodynamics and its significance (12hours)

## UNIT II

### Thermodynamics – II:

a) Need for Second law of Thermodynamics – Different statements of the law – conversion of heat into work – thermodynamic efficiency

b) Concept of entropy – Definition and physical significance of entropy – Entropy as a function of P,V and T – Entropy changes during phase changes – Entropy of mixing – Entropy criterion for spontaneous and equilibrium processes in isolated system – Gibbs free energy (G) and Helmholtz free energy(A) – variation of A and G with P,V and T – Gibb's –Helmholtz equation and its applications – Maxwell's relations –  $\Delta G$  and  $\Delta A$  criteria for spontaneity and equilibrium (12hours)

## UNIT III

### Thermodynamics – III:

a) Partial molar quantities – definition and significance of chemical potential – variation of chemical potential with T, P and mole fraction – Gibbs Duhem equation – van't Hoff reaction isotherm – van't Hoff isochore – Clapeyron equation and Clausius-Clapeyron equation – applications

b) Introduction of real system – fugacity, activity and activity coefficient

c) Third law of thermodynamics –Nernst heat theorem – Statement of Third law – Evaluation of absolute entropy from heat capacity data – Exception to Third law – Residual entropy (CO, N<sub>2</sub>O) (12hours)

## Phase Rule

a) Gibbs phase rule – definition of terms involved – Derivation of Gibb's phase rule – application of phase rule to one component system (water system) – Two component system: simple eutectic (Pb-Ag) system, compound formation, congruent melting point (Zn-Mg) system, incongruent melting point ( $\text{Na}_2\text{SO}_4\text{-H}_2\text{O}$ ) system.

b) Liquid system – partially miscible liquid system (phenol-water system) – completely miscible system (alcohol-water system) – completely immiscible system (benzene –water system) – Theory of fractional distillation - steam distillation.

c) Nernst distribution law – mathematical formulation – deviation from distribution law – solvent extraction – principle. (12hours)

## UNIT IV

### Chemical Kinetics:

a) Introduction – Rate of reaction – rate law and rate constant – order & molecularity of a reaction – Determination of order of reaction – Derivation of rate constant and half-life period for I-order reaction – Pseudo first order reaction.

b) Definition & derivation of the rate constant for the Second-order reaction ( $2A \rightarrow \text{products}$ ) – definition, rate equation and example for Third and zero order reactions

c) Influence of temperature on rate of the reaction – Arrhenius rate equation and its significance – Theory of reaction rate: Bimolecular collision theory – Unimolecular reaction: Lindemann's hypothesis – Absolute reaction rate theory (ARRT) (12hours)

## UNIT V

### Photochemistry

Comparative study of thermal and Photochemical reactions – Laws of Photochemistry: Beer-Lambert's law – Grothus-Draper law – Stark-Einstein's law.

Consequences of light absorption by atoms and molecules – Jablonski diagram – Photophysical processes – fluorescence, Phosphorescence – Photosensitization – chemiluminescence – bioluminescence - Quantum efficiency – calculation of quantum yield – kinetics of photochemical reaction – Combination of  $\text{H}_2$  &  $\text{Cl}_2$  (12hours)

## TEXT BOOKS

1. Arun Bahl, Bahl, B.S. & Tuli, G.D. (2017). *Essentials of Physical Chemistry*. 2<sup>nd</sup> Edition. New Delhi: S.Chand & Company Ltd.
2. Soni, P.L. (2008). *Text Book of Physical Chemistry*. 2<sup>nd</sup> Edition. New Delhi: Sultan Chand & Sons.
3. Rajaram, J. & Kuriakose, J.C. (2003). *Thermodynamics*. 3<sup>rd</sup> Edition. New Delhi: Chand & Co., Ltd.
4. Glasstone, S. (1998). *Thermodynamics for Chemists*. New Delhi: East-West Press (P) Ltd.

## REFERENCE BOOKS

1. Negi, A.S., and Anand, S.C., (1999). *A text Book of Physical Chemistry*. 2<sup>nd</sup> Edition. New Delhi: New Age International Publishers Pvt. Ltd.
2. Laidler, K.J. (2012). *Chemical Kinetics*. 3<sup>rd</sup> Edition. London: Harper International Edn.
3. Rohatgi, K.K. and Mukherjee, (2017). *Fundamentals of Photo Chemistry*. 3<sup>rd</sup> Edition. New Delhi: New Age International Publishers.
4. Bajpai, D.N. (2011). *Advanced Physical Chemistry*. 2<sup>nd</sup> Edition. New Delhi: S.Chand & Company Ltd.
5. Puri, B.R. Sharma, L.R. Pathania, M.S. (2008). *Elements of Physical Chemistry*. 4<sup>th</sup> Edition. Jalandhar: Vishal Publishing & Co.

Dr. J. Kavitha  
Dr. A. Anitha  
Course Designers





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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester V	<b>Analytical Methods and Introduction to Computers</b>	Hours/Week: 4	
Discipline Specific Elective1(DSEC 1)		Credits: 4	
Course Code <b>18UCHE51</b>		Internal 25	External 75

### COURSE OUTCOMES

On completion of the course, the students shall be able to

- inculcate the theory and importance of error analysis in chemical analysis
- get knowledge in the methods of analyzing colorimetric methods.
- understand the Principle of thermo gravimetric analysis
- get knowledge of the chromatographic techniques.
- gain basic knowledge on theory of Instrumentation of NMR, UV and IR.
- get skill in drawing chemdiagrams
- acquire knowledge on internet.

### UNIT I

#### Theory of Gravimetric and statistical Analyses

- a. Methods of obtaining the Precipitate - Condition - Choice of Precipitant - merits and demerits of Organic Precipitants - Types - Specific and selective precipitants- Sequestering agents - theory of precipitation - Dendrites - Paneth - Fajans - Hahn law - Coprecipitation - post precipitation -precipitation from homogeneous solution.
- b. Precision - Accuracy - Absolute and relative error – Classification of errors - - Confidence Limit - Students Q-test - Rejection of experimental data - Sources and elimination of errors - Significant figures and computation.

- c. Analysis of experimental results- Graphical method - Curve fitting - Method of least squares - Problems involving straight line graphs. (12hours)

## UNIT-II

### Instrumental methods of Analysis

#### a. Colorimetry

Beer-Lamberts Law - Principles of Colorimetric Analysis - Visual Colorimeter Standard Series method - Balancing method - Estimation of  $\text{Ni}^{2+}$  and  $\text{Fe}^{2+}$ .

#### b. Thermo analytical methods

Principle of thermogravimetric analysis and differential thermal analysis –Methods of obtaining thermograms – Derivative thermo Gravimetry –Instrumentation of TGA and DTA - factors affecting TGA and DTA curves –applications – TGA and DTA of calcium oxalate monohydrate. (12hours)

## UNIT III

### Basic principles of Chromatography

Column Chromatography - Thin layer Chromatography -  $R_f$  values - Paper

Chromatography - Ion exchange Chromatography - Gas liquid chromatography- Applications of each technique. (12hours)

## UNIT IV

### Instrumentation of NMR, UV and IR.

- a. a. Radiation source- UV and visible sources-Dispersive devices-Monochromators-gratings , slits-samples-detectors-photo voltaic cell, photo multiplier tubes-spectrophotometer for use in UV region.
- b. IR- sources of IR radiation –Monochromators - detectors techniques- simple beam and double beam spectrophotometers(brief outline only).
- c. c. NMR –Brief outline of the instrumentation (12hours)

**UNIT V****Computers in Chemistry**

- a. Chemdraw–basics-starting chemdraw-working with document-drawing chemical structures- ChemsSketch–basics- drawing chemical structures.
- b. Internet- History of internet – the working of internet services-application of internet in chemistry – downloading the attachment/ PDF files – opening – browsing and searching a website.
- c. E-mail: Introduction –working way – advantages and disadvantages- creating e-mail ID- receiving and sending e –mails. (12hours)

**TEXT BOOKS**

1. Gopalan, R. (2016). *Elements of Analytical Chemistry*. 3<sup>rd</sup> Edition. New Delhi: Sultan Chand & Sons.
2. Skoog,D.A. West,D.M. and Hollar.F.J,(2014). *Fundamentals of Analytical Chemistry*. 9<sup>th</sup> Edition.U.K: Harcourt College Publishers.
3. Usharani,S. (2000). *Analytical Chemistry*. 1<sup>st</sup> Edition. Chennai: Macmillan India Ltd.
4. Srivastava, A.K & Jain.P.C. (2009). *Instrumental Approach to Chemical Analysis*. 4<sup>th</sup> Edition. New Delhi: S.Chand & Company Ltd.
5. <https://library.columbia.edu>>
6. <https://www.acdlabs.com>> docs

**REFERENCE BOOKS**

- 1.Sharma, B.K. (2015). *Instrumental Methods of Chemical Analysis*. 30<sup>th</sup> Edition. New Delhi: Krishna Prakashan Media Pvt.Ltd.
- 2.[http://www.cambridgesoft.com/support/DesktopSupport/documentation/manuals/files/che\\_mbioldraw.pdf](http://www.cambridgesoft.com/support/DesktopSupport/documentation/manuals/files/che_mbioldraw.pdf)
3. [www.chem.uzh.ch](http://www.chem.uzh.ch)> gpc > files
4. [www.chemteach.ac.nz](http://www.chemteach.ac.nz)> misc

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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester V	<b>TEXTILE CHEMISTRY</b>	Hours/Week: 4	
Discipline Specific Elective1(DSEC 1)		Credits: 4	
Course Code <b>18UCHE52</b>		Internal 25	External 75

### COURSE OUTCOMES

On completion of the course, the students will be able to

- understand the classification of natural fibres and their physical and chemical properties.
- know about different synthetic fibres, their manufacture and properties.
- acquire knowledge about scouring and desizing processes.
- clear idea about bleaching technique.
- acquire knowledge about principles of dyeing, synthesis of dyestuffs and fastness properties. Students should be able to dye different fibres and test various fastness properties.

### UNIT I

#### VEGETABLE FIBRES AND ANIMAL FIBRES

Definition – classification of textile fibres – essential and desirable properties of textile fibres – Cotton fibre – Physical and Chemical properties, Jute – Purification; physical and chemical properties of jute, silk and wool (12hours)

## **UNIT II**

### **REGENERATED AND SYNTHETIC FIBRES**

Rayon – different types of rayon and their sources - manufacturing of viscose rayon – physical and chemical properties – acetate rayon – manufacture – properties, cuprammonium rayon – manufacture and properties. Manufacture – properties and uses of polyamides - polyester – polypropylene and polyacrylonitrile. (12hours)

## **UNIT III**

### **PREPARATORY PROCESS PRIOR TO DYEING**

Scouring: Objectives of scouring – process of caustic scouring on open kier and closed kier machine with sine diagram, scouring with NaOH and Na<sub>2</sub>CO<sub>3</sub> – Precautions to be taken before scouring. Desizing using malt extract – merits and demerits of acid and enzyme desizing. Singeing – Impurities present in grey cotton and cotton fabric – objects of singeing – process of singeing on gas singeing machine – precautions to be taken during gas singeing. (12hours).

## **UNIT IV**

### **PRINCIPLES OF BLEACHING**

Principles of wetting and mechanism of detergency – synthetic detergents – surface active agents – bleaching processes – bleaching agents – H<sub>2</sub>O<sub>2</sub>, NaOCl, bleaching powder and biobleaching and their properties – bleaching of cotton, rayon, wool and syntheticfibres. (12hours)

## **UNIT V PRINCIPLES OF DYEING**

Colour and Chemical constitution – Chromophore and auxochromes – natural and synthetic dyes – dyes - classification, synthesis of dyeshift – congored, bismark brown and crystal violet, theories of dyeing – effect of temperature and salt on dyeing – dyeing of wool, silk and poly-esters – dyeing of cotton with reactive dyes – fastness properties – washing , light, rubbing and perspiration. (12hours)

### TEXT BOOKS

1. Sharma, B.K.(2008). *Industrial Chemistry*. 1<sup>st</sup> Edition. Meerut: GOEL Publishing House.
2. Bagavathi Sundari. K,(2006). *Applied Chemistry*. 1<sup>st</sup> Edition. Chennai: MJP Publishers.
3. Rangnekar,D.W & Singh, P.P.(1980). *An Introduction to Synthetic Dyes* 1<sup>st</sup> Edition. Bombay: Himalaya Publishing House.

### REFERENCE BOOKS

1. Jaya Shree Ghosh, (2013). *Fundamental Concepts of Applied Chemistry*. 1<sup>st</sup> Edition. New Delhi: S.Chand & Company Ltd
2. Thankamma Jacob. (1979). *A Text Book of Applied Chemistry for Home Science and Allied Sciences*. 1<sup>st</sup> Edition. New Delhi: The Macmillan Company of India Ltd.
3. Jain, P.C. & Monika Jain, (2013). *Engineering Chemistry*. 1<sup>st</sup> Edition. New Delhi: Dhanpat Rai Publishing Company Pvt.Ltd.

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VIRUDHUNAGAR - 626 001

### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester V	<b>AGRICULTURAL CHEMISTRY</b>	Hours/Week: 4	
Discipline Specific Elective1(DSEC 1)		Credits: 4	
Course Code <b>18UCHE53</b>		Internal 25	External 75

### COURSE OUTCOMES

On completion of the course, the students will be able to

- understand the soil and its formation
- know the physical properties of soil and other related aspects
- acquire knowledge about chemistry aspects of soil and nitrogen fixing process
- understand the chemistry of nutrients present in soil
- comprehend the chemistry of pesticides, fungicides and herbicides.

### UNIT I

#### ORIGIN OF SOIL

Definition of soil – origin – igneous – metamorphic and sedimentary rocks – rock systems – weathering of rocks and minerals – main components of soil – organic, inorganic, liquid and gaseous phase – minerals of importance with respect to soils, industries and agriculture – Soil formation – physical, chemical and biological factors responsible for soil formation – soil forming processes – major soil groups of Tamil Nadu – Soil survey standard soil survey – methods of soil survey – remote sensing and soil mapping – soil resource management – use of satellite data for source inventory.

(12hours)

## **UNIT II**

### **PHYSICAL PROPERTIES OF SOIL**

Physical properties of soil – soil texture and textural classification – pore space – bulk density, particle density – soil structure and soil colour- surface area – soil colloids – plasticity, shrinkage – flocculation and deflocculation - soil air, soil temperature, their importance in plant growth – soil reaction – Ion exchange reaction – cation exchange – anion exchange – Buffering capacity – hydrogen ion concentration – determination of pH values – Factors affecting soil pH – Soil pH and nutrient availability – Soil degradation – causes. (12hours)

## **UNIT III**

### **CHEMISTRY ASPECTS OF SOIL**

Origin of problem soils, their properties, acid, alkali and saline soils – diagnosis – remediation of acid and salt affected soils – Methods of reclamation and after care – Quality of irrigation water – causes for poor quality waters for irrigation, their effects in soils and crops. Soil testing – Concept, objectives and basis – soil sampling, tools, collection processing, dispatch of soil and water samples, soil organic matter – its decomposition and effect on soil fertility – source of organic matter in soil – maintenance and distribution – soil organism – their role – nitrification – denitrification , nitrogen fixation in soils – biological nitrogen fixation – microbial interrelationship in soil – microbes in pest and disease management – Bio-conversion of agricultural wastes. (12hours)

## **UNIT IV**

### **PLANT NUTRIENTS**

Plant nutrients – macro and micro nutrients – their role in plant growth – sources – forms of nutrient absorbed by plants – factors affecting nutrient absorption – deficiency symptoms in plants – corrective measures –chemicals used for correcting nutritional deficiencies – nutrient requirement of crops, their availability, fixation and release of nutrients. Fertilizers – classification of NPK fertilizers – sources – natural and synthetic – straight- complex – liquid fertilizers, their properties, use and relative efficiency – secondary and micro nutrient fertilizers – mixed fertilizers – principle of fertilizers use –



the efficient use of various fertilizers – integrated nutrient management biofertilizers – rhizobium, azospirillum, azotobacter – Blue green algae and azolla production and quality control of bio-fertilizers. (12hours)

## UNIT V

### PESTICIDES, FUNGICIDES AND HERBICIDES

Pesticides: Definition – Classification – organic and inorganic pesticides – mechanism of action – Characteristics – Safe handling of pesticides – impact of pesticides on soil, plants and environment – Acts and Laws concerning the pesticides. Fungicides: Definition – Classification – mechanism of action – sulfur, copper, mercury compounds, dithianes, dithiocarbamates. Herbicides: Definition – Classification – mechanism of action – Arsenic and boron compounds – nitro compounds, chloro compounds, Triazines, propionic acid derivatives, urea compounds, Acaricides – Rodenticides – Attractants – Repellants – Fumigants defoliant. (12hours)

### TEXT BOOKS

1. Sharma, B.K.(2008). *Industrial Chemistry*. 1<sup>st</sup> Edition. Meerut: GOEL Publishing House, Bagavathi Sundari. K,(2006). *Applied Chemistry*. 1<sup>st</sup> Edition. Chennai: MJP Publishers.
2. Jaya Shree Ghosh, (2013). *Fundamental Concepts of Applied Chemistry*. 1<sup>st</sup> Edition. New Delhi: S.Chand & Company Ltd.
3. Firman, E. (1964). *Chemistry of the Soil*. 2<sup>nd</sup> Edition. New Delhi: Oxford & IBH Publishing Co.
4. Sree Ramulu, U.S. (1979). *Chemistry of Insecticides and Fungicides*. 1<sup>st</sup> Edition. New Delhi: Oxford & IBH Publishing Co.

### REFERENCE BOOKS

1. Small scale Industries manual from District Industrial centre. (DIC)
2. Thankamma Jacob. (1979). *A Text Book of Applied Chemistry for Home Science and Allied Sciences*. 1<sup>st</sup> Edition. New Delhi: The Macmillan Company of India Ltd.
3. Jain, P.C. & Monika Jain, (2013). *Engineering Chemistry*. 1<sup>st</sup> Edition. New Delhi: Dhanpat Rai Publishing Company Pvt.Ltd.

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VIRUDHUNAGAR - 626 001

### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester V	<b>ANALYSIS OF OILS/FATS AND WATER PRACTICAL</b>	Hours/Week: 1T+1P	
Skill Enhancement Course- 4		Credits: 2	
Course Code <b>18UCHS51P</b>		Internal 40	External 60

#### Analysis of Oils/Fats

Determination of Specific gravity, Surface tension, Viscosity, Iodine value , saponification value, % of free fatty acid.

Adulteration Tests: Baudouin test, Halphen test

#### Analysis of Water

Determination of hardness, salinity and alkalinity.



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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester V	<b>NANOTECHNOLOGY</b>	Hours/Week: 2	
Skill Enhancement Course- 5		Credits: 2	
Course Code <b>18UCHS52</b>		Internal 40	External 60

### COURSE OUTCOMES

On completion of the course, the students will be able to

- acquire an idea on basic concepts of Nanotechnology.
- get an exposure of the types of nanomaterials
- comprehend about the fabrication and characterization techniques available in literature.
- apprehend the chemical properties of nanomaterials.
- know the applications of nanomaterials

### UNIT I

#### Nanotechnology

Introduction – Fundamental concepts – Advantages of nanotechnology – Types of nanocrystals – Zero, one, two, three dimensional nanomaterials and natural nanomaterials with examples. (6hours)

### UNIT II

#### Synthesis of nanomaterials

Fabrication of nanomaterials – Top-down approach – Lithography – Bottom-up approach- pulsed laser vapourization – Chemical vapour deposition. (6hours)

### UNIT III

#### Characterization of nanomaterials

Scanning Tunnelling microscope – Atomic force microscope – Transmission electron microscope – X-ray diffractometer. (6hours)

### UNIT IV

#### Properties of nanomaterials

Unique material properties at nano scale – Optical properties – Surface properties – Electrical properties and Magnetic properties. (6hours)

### UNIT V

#### Applications of nanomaterials

Applications in medicinal field , catalysis, filtration, cosmetics, and textiles. (6hours)

### TEXT BOOKS

1. Pradeep,T, (2017).*Nano: The Essentials- Understanding Nanoscience and Nanotechnology*. 1<sup>st</sup> Edition.New Delhi: McGraw Hill Education (India) Private limited.
2. Poole,P.& Frank ,O.(2017).*Introduction to Nanotechnology*. 1<sup>st</sup> Edition. Nodia: Wiley India Pvt. Ltd.

### REFERENCE BOOKS

1. Shah,M.A. &Tokeer Ahmed (2013). *Principles of Nanoscience and Nanotechnology*. 1<sup>st</sup> Edition. Delhi:Narosa Publishing House Pvt Ltd.
2. Subbiahbalaji, (2010). *Nanobiotechnology*. 1<sup>st</sup> Edition. Chennai: MJP Publishers.

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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester VI	<b>ORGANIC CHEMISTRY-III</b>	Hours/Week: 5	
Core Course-10		Credits: 4	
Course Code <b>18UCHC61</b>		Internal 25	External 75

### COURSE OUTCOMES

On completion of the course, the students will be able to

- know the basic concepts of UV- visible spectroscopy and photochemistry
- get knowledge about IR, NMR and Mass spectroscopy
- acquire knowledge about chemistry of natural products
- comprehend about biomolecules
- understand the importance of reagents in organic synthesis, molecular rearrangements and theory of dyes

### UNIT I

#### UV-Visible Spectroscopy and Organic photochemistry

**UV-Visible Spectroscopy** : Introduction to electromagnetic radiation – Theory of electronicspectroscopy – Types of electronic transitions – bathochromic shift and hypsochromic shift – hyperchromic effect – hypochromic effect – Woodward-Fischer rules – calculation of  $\lambda_{\max}$  for dienes and  $\alpha,\beta$ - unsaturated carbonyl compounds.

**Organic photochemistry**: Introduction – photolysis – types of photochemical reactions – definition with an example – elimination, reduction, oxidation, isomerisation, rearrangement, cyclisation and intermolecular cycloadditions. (15 hours)

### UNIT II

#### IR,NMR and Mass Spectroscopy

a) **IR Spectroscopy:** Principle – different modes of Vibration - Hookes law – factors affecting vibrational frequency – Electronic effect and Hydrogen bonding – Finger print region. Application of IR spectroscopy in the identification of cis-trans isomers and aldehydes and ketones.

b) **NMR Spectroscopy:** Principle – Number of signals chemical shift – shielding and deshielding effects – Anisotropy in alkenes, alkynes and benzene – hydrogen bonding – peak area and proton counting – splitting of the signals – spin-spin coupling – coupling constant – spectrum of ethanol.

c) **Mass spectrometry:** Principle – molecular or parent ion peak - mass spectrum – base peak – modes of fragmentation – McLafferty rearrangement (brief study) - metastable peak. (15 hours)

### UNIT III

#### Alkaloids and Terpenoids:

i) **Alkaloids** - classification –occurrence-general characteristics -general procedure for determining the structure- structural elucidation of coniine, nicotine and piperine.

ii) **Terpenes:** Classification –occurrence- isolation –general properties - isoprene rule – general procedure for determining the structure- structural elucidation of citral, menthol and camphor. (15 hours)

### UNIT IV

#### Biomolecules

i) **Amino acids:** Classification-Gabriel's phthalimide and Strecker's synthesis-properties.

ii) **Proteins:** Classification - Primary, Secondary, tertiary and quaternary structures of protein - denaturation - colour reactions of proteins.

iii) **Nucleic acids:** Nucleosides - nucleotides - RNA and DNA – Structure and their functions.

iv) **Vitamins:** Vitamins and their biological importance structure of vitamin A, B<sub>6</sub>, C and K(structure only)

v) **Hormones:** Thyroxine, Testosterone, progesterone and estrone – structure (elucidation not necessary) and biological importance. (15 hours)

## UNIT V

### Reagents in Organic synthesis, Molecular rearrangement and Dyes

#### i) Reagents in Organic synthesis

Oxidation reaction involving  $\text{SeO}_2$  and lead tetraacetate with mechanism

Reduction reactions: Birch reduction, Wolf-Kishner reduction with mechanism

ii) **Molecular rearrangement:** Detailed Mechanism of the following: Pinacol – Pinacolone, Hofmann, Beckmann and Claisen rearrangements

iii) **Dyes:** Definition-theory of colour and constitution-classification of dyes according to structure and application.

- a) Azo dyes: Preparation and uses of methyl orange and bismark brown.
- b) Triphenylmethane dyes: Preparation and uses of rosaniline and crystal violet.
- c) Phthalein dyes: Preparation and uses of phenolphthalein
- d) Xanthene dyes: Preparation and uses of fluorescein and eosin.
- e) Indigoid dyes: Preparation and uses of indigo.
- f) Anthraquinoid dyes: Preparation and uses of alizarin. (15 hours)

## TEXT BOOKS

1. Arun Bahl & Bahl, B.S. (2012). *Advanced Organic Chemistry*. 19<sup>th</sup> Edition .New Delhi: S.Chand & Company Ltd.
2. Tewari, K.S. & Vishnoi, N.K. (2006). *A Text book of Organic Chemistry*. 3<sup>rd</sup> Edition. New Delhi: Vikas Publishing House Pvt. Ltd.
3. Sharma, Y.R. (2018). *Elementary Organic Spectroscopy*. 5<sup>th</sup> Edition. New Delhi: S Chand Company(P) Ltd.
4. Sanyal, S.N. (2018). *Reactions, Rearrangement and Reagents*. 4<sup>th</sup> Edition. Patna: Bharati Bhawan.

## REFERENCE BOOKS

1. Finar, I.L. (2006). *Organic Chemistry*. Vol –I. 6<sup>th</sup> Edition. Singapore: Pearson Education Pvt. Ltd .
2. Soni, P.L. (2008). *Text Book of Organic Chemistry*. 2<sup>nd</sup> Edition. New Delhi:

Sultan Chand & Sons.

3. Finar, I.L. (2003). *Organic Chemistry*. Vol.II, 5<sup>th</sup> Edition. Singapore: Pearson education.
4. Ahluwalia, V.K. (2015). *Organic Reaction Mechanism*. 4<sup>th</sup> Edition. New Delhi: Narosa Publishing House.

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VIRUDHUNAGAR - 626 001

### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester VI	<b>PHYSICAL CHEMISTRY-II</b>	Hours/Week: 5	
Core Course- 11		Credits: 4	
Course Code <b>18UCHC62</b>		Internal 25	External 75

### COURSE OUTCOMES

On completion of the course, the students will be able to

- know about the ionic conductivity
- understand types of electrochemical cells
- understand the transformation of chemical energy into electrical energy
- know about electromagnetic spectrum
- understand the theory of rotational spectroscopy and its applications
- learn about IR and Raman spectroscopy
- know the principle and applications of UV- visible spectroscopy

### UNIT I

Electrochemistry – I:

- a) Conductance – definition and determination of specific, equivalent and molar conductance – weak and strong electrolytes according to Arrhenius theory - Ostwald's dilution law – applications and limitation – variation of equivalent conductance with concentration
- b) Migration of ion – ionic mobility – Kohlrausch's law – its applications – elementary treatment of Debye-Huckel-Onsager equation for strong electrolytes – Transport number and Hittorf's rule – determination of transport number by Hittorf's method.

c) Applications of conductivity measurement – determination of solubility product of a sparingly soluble salt and conductometric titration – common ion effect – Buffer solution – definition – Henderson equation (derivation not required) and its applications

(15hours)

## UNIT II

### Electrochemical cells :

a) Concepts of electrochemical cell – cell diagram and terminology – conventions regarding signs of cell emf – calculation of cell emf from single electrode potential – standard emf of the cell – Nernst equation

b) Reversible and irreversible cells – thermodynamics and electromotive force – calculation of  $\Delta G$ ,  $\Delta H$ ,  $\Delta S$  and  $K_{eq}$  for cell reaction

c) Single electrode potentials and emf measurement - electrochemical series and its applications – types of electrodes – reference electrode ( SHE, Calomel electrode, Ag-AgCl electrode) – standard electrode potential –experimental determination of cell emf – Weston cadmium cell

d) Determination of pH using hydrogen electrode, glass electrode and quinhydrone electrode – Potentiometric and conductometric titrations

(15hours)

## UNIT III

### Types of electrochemical cells :

a) Chemical cells with and without transference – examples – liquid junction potential – salt bridge

b) Concentration cells – definition – types of concentration cells – examples – emf of electrolyte concentration cells with and without transference

c) Commercial cells: Primary and secondary cells – dry cell – lead storage cell – fuel cell – Hydrogen-Oxygen fuel cell

(15 hours)

## UNIT IV

### Spectroscopy – I:

a) Electromagnetic spectrum – Regions of various types of spectra - Microwave spectroscopy – Rotational spectra of diatomic molecule treated as rigid rotator – conditions

for a molecule to be microwave active – rotational constant (B) – selection rule for rotational transition – frequency of spectral lines – calculation of inter-nuclear distance in diatomic molecules

b) IR spectroscopy: Vibrations of diatomic molecules – Harmonic and anharmonic oscillators – zero point energy – dissociation energy and force constant – condition for a molecule to be active in IR region – vibrational modes of CO<sub>2</sub> and H<sub>2</sub>O – selection rule for vibrational transition – fundamental bands, overtones and hot bands – diatomic vibrating rotator – P,Q,R branches – Determination of force constant. (15 hours)

## UNIT V

### Spectroscopy – II:

c) Raman spectroscopy: Rayleigh scattering and Raman scattering – Stokes and anti-Stokes lines in Raman spectra – Raman frequency – condition for a molecule to be Raman active – comparison of Raman and IR spectra

d) UV Visible spectroscopy - conditions for a molecule to be UV active – Theory of electronic spectroscopy – types of electronic transitions – Franck-Condon principle – pre-dissociation (15 hours)

## TEXT BOOKS

1. Puri, B.R. Sharma, L.R. Pathania, B.K. (2017). *Elements of Physical Chemistry*. 2<sup>nd</sup> Edition. Jalandhar: Vishal Publishing Company.
2. Soni, P.L. Dharmarha, O.P. Dash, U.N. (2015). *Text book of Physical Chemistry*. 4<sup>th</sup> Edition. New Delhi: Sultan Chand & Sons.
3. Banwell, C.N. (2011), *Molecular spectroscopy*. 2<sup>nd</sup> Edition. New Delhi: McGraw Hill.
4. Sharma, Y.R. (2011). *Elementary Organic spectroscopy-Principles and Chemical Applications*. 3<sup>rd</sup> Edition. New Delhi: S.Chand & Company Limited.
5. Negi, A.S. & Anand, S.C. (1998). *A Text Book of Physical Chemistry*. 2<sup>nd</sup> Edition. New Delhi: New Age International Publishers.

## REFERENCE BOOKS

1. Kundu, N. Jain, S.N. (1999). *Physical Chemistry*. 2<sup>nd</sup> Edition. New Delhi: S.Chand & Co.

2. Glasstone, S. (1998). *A Text Book of Physical Chemistry*. 1<sup>st</sup> Edition. New Delhi: East-West Press.
3. Yadav, L.D.S.(2001). *Organic Spectroscopy*. 3<sup>rd</sup> Edition. London:Palgrave Publication:
4. Chang, R.(2004). *Basic Principles of Spectroscopy*. 1<sup>st</sup> Edition. New Delhi: McGraw Hill.
5. Silverstein, B.M. Bassler, G.C. Morrill, T.C.( 2004).*Spectrometric identification of Organic Compounds*. 6<sup>th</sup> Edition. New Jersey:John-Wiley& Sons.
6. Kemp.(2009). *Elementary Organic Spectroscopy*. 3<sup>rd</sup> Edition. London:Palgrave Publication.
7. Glasstone, S.(1997). *Introduction to Electrochemistry*, 1<sup>st</sup> Edition. New York: Van Nostrand Company Ltd.

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VIRUDHUNAGAR - 626 001

### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester VI	<b>APPLIED CHEMISTRY</b>	Hours/Week: 5	
Core Course- 12		Credits: 4	
Course Code <b>18UCHC63</b>		Internal 25	External 75

#### COURSE OUTCOMES

On completion of the course, the students will be able to

- inculcate the importance of micro and macro nutrients in fertilizers
- get knowledge in the petro chemicals and their uses
- understand the raw materials required for match industry and their function
- get knowledge about the types of explosives and fuels and their uses.
- gain basic knowledge on the chemistry of corrosion and prevention.
- understand the manufacture of wine, Beer and power alcohol
- comprehend the cement, glass and ceramic industries.

#### UNIT I

##### Fertilizers and Petro chemicals

- a. Fertilizers: Nutrients for plants – role of various elements in plant growth – natural and chemical fertilizers – classification of chemical fertilizers – Urea, super phosphate and potassium nitrate mixed fertilizers – fertilizer industry in India.
- a) Petro chemicals: (Elementary study) definition – origin – composition – chemicals from natural gas, petroleum, light naphtha and kerosene – synthetic gasoline.

(15hours)

#### UNIT II

##### Fireworks explosives and fuels

- a) **Match industry** – safety matches – raw materials and their function – Chemistry of lighting a match stick.

- b) **Pyrotechny** - raw materials – coloured smokes – uses.
- c) **Explosives** – Definition - classification – primary, low and high explosives – example - Composition and uses of gun powder, gun cotton, cordite, TNT and RDX.
- d) **Fuels** –Types of fuels, composition and applications of fuels with examples – liquid fuels – gaseous fuels- nuclear fuels. (15hours)

### UNIT III

#### Corrosion and its control

Definition –classification- chemistry of corrosion-factors influencing on corrosion –corrosion monitoring techniques -Corrosion control – corrosion inhibitors- protective coatings,galvanizing, tinning – electroplating and electrochemicalpassivation .

(15hours)

### UNIT IV

#### Alcoholic beveragesand Paper Industry

- a) Alcoholic beverages: Introduction –types–manufacture of spirit,wine, beer
- b) Paper Industry: Introduction – preparation of different kinds of raw material used-sulphite pulp, soda pulp and rag pulp- processes involved in paper industry – beating, refining, filling, sizing and coloring – manufacture of paper, calendering and its uses. (15hours)

### UNIT V

#### Silicate industry,Paints and lacquers

- a) Silicate industry- Manufacture of cement- theory of setting of cement-manufacture of glass and ceramics.
- b) Paints and lacquers: Ingredients in paint manufacture – lacquers – varnishes.

(15hours)

### TEXT BOOKS

1. Sharma, B.K.(2008). *Industrial Chemistry*. 1<sup>st</sup> Edition. Meerut: GOEL Publishing House.
2. Bagavathi Sundari. K,(2006). *Applied Chemistry*. 1<sup>st</sup> Edition. Chennai: MJP Publishers.

3. Puri, B.R. Sharma, L.R. & Kalia, K.C.(2008). *Principles of Inorganic Chemistry*. 2<sup>nd</sup> Edition.Jalandhar: Milestone Publishers..
4. Soni, P.L. (2008). *A Text book of Inorganic Chemistry*. 2<sup>nd</sup> Edition. New Delhi: Sultan Chand & Sons.

#### REFERENCE BOOKS

1. Jaya Shree Ghosh, (2013). *Fundamental Concepts of Applied Chemistry*. 1<sup>st</sup> Edition.New Delhi: S.Chand & Company Ltd.
2. Small scale Industries manual from District Industrial centre. (DIC)
3. Thankamma Jacob, (1979). *A Text Book of Applied Chemistry for Home Science and Allied Sciences*. 1<sup>st</sup> Edition.New Delhi: The Macmillan Company of India Ltd.
4. Jain, P.C. & Monika Jain. (2013). *Engineering Chemistry*. 1<sup>st</sup> Edition. New Delhi: Dhanpat Rai Publishing Company Pvt.Ltd.

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### B.Sc. CHEMISTRY (SEMESTER) (For those who join in 2018-2019 and after)

Semester VI	<b>MEDICINAL CHEMISTRY</b>	Hours/Week:5	
<b>DSEC -2</b>		Credits: 4	
Course Code <b>18UCHE61</b>		Internal 25	External 75

#### COURSE OUTCOMES

On completion of the course, students will be able to

- acquire the knowledge on pharmacognosy, pharmacology and medicinal chemistry.
- apprehend the mechanism of drug action.
- get an exposure on metabolic pathway of drugs.
- get an idea about some chemotherapeutic agents.
- gain knowledge on pharmaceutical importance of Inorganic compounds.
- acquire basic knowledge on first aid.

#### UNIT I Introduction

Sources of drugs – Terminologies –Pharmacy – Pharmacology – Molecular pharmacology – pharmacodynamics – Pharmacokinetics – Pharmacophore – Antimetabolites – Mutation – Chemotherapy – Pharmacognosy – Classification of drugs – Mechanism of drug action – Action at cellular & extracellular sites – Drug receptors and biological responses. (15hours)



## **UNIT II Metabolism of drugs**

Different types of drug action- Absorption of drugs – Routes of administration of drugs – factors affecting absorption – Assay of Drugs – Drug Dosage–Metabolism of drugs – Chemical pathways of drug metabolism. (15hours)

## **UNIT III Analgesics, Anaesthetics , Common poisons and antidotes**

1. Analgesics – Definition – Types – Narcotic analgesics - Action of morphine – Synthetic analgesics –preparation of pethidine – Non - narcotic analgesics – Preparation of Aspirin and paracetamol
2. Anaesthetics – Characteristics – Classification – Advantages and Disadvantages of ether chloroform – Local Anaesthetics – Cocaine.
3. Common poisons and antidotes - Acid poisoning, Alkali poisoning, poisoning by disinfectants, Alcohol poisoning, Mercury poisoning, and Salicylate poisoning. (15hours)

## **UNIT IV Medicinal uses and Biological role of Inorganic compounds**

1. Inorganic compounds and their medicinal uses – Compounds of Aluminium, Phosphorus, Iron, Platinum and Mercury.
2. Biological role of Inorganic compounds – Sodium, Potassium, Calcium, Iodine, Copper and Zinc. (15 hours)

## **UNIT V Common diseases, Diabetes, Cancer and First aidfor accidents**

1. Common diseases and their treatment – Malaria, Common cold, Plague, Diphtheria, tuberculosis, cholera, typhoid, dysentery, jaundice, asthma & epilepsy.
2. Diabetes – Types – Control – hypoglycaemic drug – insulin
3. Cancer – Types – Common causes of cancer – spread of cancer – treatment of cancer – cytotoxic agents - Melphalan
4. First aid for accidents – Important rules of first aid – First aid box – First aid for Bleeding, Fractures, Burns, Fainting and poisonous bites. (15 hours)

## TEXT BOOKS

- 1) Jayashree Ghosh. ( 2014).*A Text Book of Pharmaceutical Chemistry*. 3<sup>rd</sup> Edition. New Delhi: S.Chand & Company Ltd.
- 2) Ashutosh Kar. (2010). *Medicinal Chemistry*. 5<sup>th</sup> Edition. New Delhi: New Age International Publishers.
- 3) Ilango, K.& Valentina, P. (2007). *Text Book of Medicinal Chemistry*. 1<sup>st</sup> Edition. Chennai:, Keerthi Publishers.

## REFERENCE BOOKS

1. Parimoo, P. (2011), *A Text Book of Medicinal Chemistry*. 1<sup>st</sup> Edition. New Delhi: CBS Publishers & Distributors Pvt.Ltd.
2. Delgado,J.N. & Remers, W.A.(1998).*Text book of Organic,Medicinal & Pharmaceutical Chemistry*. 9<sup>th</sup> Edition.Philadelphia: J.B. Lippincott Company.

Mrs.M.Dhanalakshmi  
Mrs.R.Nagasathya  
Course Designers



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VIRUDHUNAGAR - 626 001

### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester VI	<b>MATERIAL CHEMISTRY AND BIO MOLECULES</b>	Hours/Week:5	
DSEC -2		Credits: 4	
Course Code <b>18UCHE62</b>		Internal 25	External 75

### COURSE OUTCOMES

On completion of the course, the students shall be able to

- acquire knowledge about different types of magnetic and insulating materials.
- understand about modern engineering materials like Metallic glasses, biomaterials and advanced ceramics.
- know the chemistry of proteins and lipids.
- acquire knowledge about nucleic acids and the energy changes involved in the metabolic processes.
- comprehend the chemistry of enzymes and their kinetics.

### UNIT I

#### MAGNETIC MATERIALS

Introduction – types of magnetic materials – diamagnetism – paramagnetism, ferromagnetism. Ferrites: Preparation and their applications in microwave –floppy disk – magnetic bubble memory and applications. Insulating Materials: Classification – on the basis of temperature – Polymer insulating materials and ceramic insulating materials. Ferroelectric materials: Examples – applications of ferroelectrics. (15 hours)

### UNIT II

#### MODERN ENGINEERING MATERIALS:

Metallic glasses – Introduction – Composition, properties and applications. Shape memory alloys: Introduction – examples – application of SMA – advantages and disadvantages. Biomaterials: Introduction – metals and alloys in biomaterials – ceramic biomaterials, composite biomaterials – polymer biomaterials. (15 hours)

### UNIT III

#### PROTEINS AND LIPIDS:

Amino acid – structure – proteins – classification – peptide bond – protein – classification structures. Albumins – egg and milk protein- membranes – In pumps and ion channels – Glycolipids and sulfolipids. (15 hours)

### UNIT IV

#### NUCLEIC ACIDS AND BIO ENRGETICS:

Nucleotides –nucleosides – DNA – RNA – types of metabolism of nucleic and biosynthesis – ADP – ATP – low and high energy metabolites – Metabolism – Concept of S - G – exergonic and endergonic reaction – Glycolysis – simplified reaction – Kreb cycle. (15 hours)

### UNIT V ENZYMES:

Nomenclature classification, biological role of enzymes – specificity – enzyme action- Michaelis – Menten equation – models – Emal Fisher's lock and key model – Koshland's induced fit model – Co-enzymes – NAD, NADPH – Chymotrypsin – coenzymes. (15hours)

### TEXT BOOKS

1. Mohan,S. Arjunan,V. Jose,P.&Kanchanamala,M. (2016). *Principles of Material Science*. 1<sup>st</sup> Edition.New Delhi: MJP Publishers.
2. Ahluwalia,V.K.(2016). *Chemistry of Natural Products*. 1<sup>st</sup> Edition.New Delhi: Ane Books Pvt Ltd.
3. Satyanarayana,U. (2000). *Biochemistry*. 1<sup>st</sup> Edition.Calcutta: Books and Allied (P) Ltd.

### REFERENCE BOOKS

1. Jain, P.C. & Monika Jain, (2013). *Engineering Chemistry*. 1<sup>st</sup> Edition. New Delhi: Dhanpat Rai Publishing Company Pvt.Ltd.
2. Sivasankar, B.(2008).*Engineering Chemistry*. 1<sup>st</sup> Edition. New Delhi: Tata McGraw Hill Education Pvt Ltd..
3. Lehninger, L.A. (1993). *Biochemistry*. 2<sup>nd</sup> Edition.New Delhi: Kalyani Publishers.

Mrs.M.Dhanalakshmi  
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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester VI	<b>DAIRY CHEMISTRY</b>	Hours/Week:5	
<b>DSEC -2</b>		Credits: 4	
Course Code <b>18UCHE63</b>		Internal 25	External 75

### COURSE OUTCOMES

On completion of the course, the students will be able to

- understand the chemical composition of milk.
- know the techniques of milk processing
- acquire knowledge about various milk products
- understand about different types of special milk.
- comprehend techniques of fermentation of milk and various milk products.

### UNIT I

#### COMPOSITION OF MILK

Milk – definition – general composition of milk – constituents of milk – lipids, proteins, carbohydrate, vitamins and minerals – physical properties of milk – colour, odour, acidity, specific gravity, viscosity and conductivity – Rennet effect – factors affecting the composition of milk – adulterants, preservatives and neutralizer – examples and their detection – estimation of fat, acidity and total solids in milk.

(15 hours)

### UNIT II

#### PROCESSING OF MILK

Microbiology milk – destruction of micro organisms in milk – physico – chemical changes taking place in milk due to processing – boiling, pasteurization – types of pasteurization –

Bottle, Batch and HTST (High Temperature Short Time) – Vacuum pasteurization – Ultra High Temperature Pasteurization. (15 hours)

### **UNIT III**

#### **MAJOR MILK PRODUCTS**

Cream – definition – composition – chemistry of creaming process – gravitational and centrifugal methods of separation cream – estimation of fat in cream. Butter – definition – composition – theory of churning – desibutter – salted butter – estimation of acidity and moisture content in butter. Ghee – major constituents – common adulterants added to ghee and their detection – rancidity – definition – prevention – antioxidants and synergists – natural and synthetic. (15 hours)

### **UNIT IV**

#### **SPECIAL MILK**

Standardised milk – definition – merits – reconstituted milk – definition – flow diagram of manufacture – Homogenised milk – flavoured milk – vitaminised milk – toned milk – Incitation milk – vegetable toned milk – humanized milk – condensed milk – definition composition and nutritive value. (15 hours)

### **UNIT V**

#### **FERMENTED AND OTHER MILK PRODUCTS**

Fermented milk products – fermentation of milk – definition, condition, cultured milk – definition of culture examples, conditions – cultured cream – cultured butter milk – Bulgaxious milk – acidophilous milk – YoheerIndigeneour products -Khoa and chchana definition – preparation of khoa and chchana sweets – Gulabjamun, chana sweet, Rasogolla. Ice cream – definition – percentage composition types – Ingredients – manufacture of ice-cream stabilizers – emulsifiers and their role milk powder – definition – need for making milk powder – drying process – types of drying dairy detergents – characteristics – classification – washing procedure – sterilization – chloramine T and hypochlorite solution. Visit to a pasteurization factory / Milk product company and submission of a report. (15 hours)

### TEXT BOOKS

1. JayaShree Ghosh, (2013). *Fundamental Concepts of Applied Chemistry*. 1<sup>st</sup> Edition. New Delhi: S.Chand & Company Ltd.
2. Bagavathi Sundari. K,(2006). *Applied Chemistry*. 1<sup>st</sup> Edition. Chennai: MJP Publishers.
3. Sukumar De. (2000). *Outlines of Dairy Technology*. 1<sup>st</sup> Edition. New Delhi: Oxford University Press.

### REFERENCE BOOK

1. Wong,N.P. Jenness,R. Keenay,M.& Matr,E.H. (1998), *Fundamentals of Dairy Chemistry*. 1<sup>st</sup> Edition. New Delhi: CBS Publishers & Distributors Pvt.Ltd.

Mrs.M.Dhanalakshmi  
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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester VI	<b>GREEN CHEMISTRY</b>	Hours/Week: 2	
Skill Enhancement Course- 6		Credits: 2	
Course Code <b>18UCHS61</b>		Internal 40	External 60

### COURSE OUTCOMES

On completion of the course, the students shall be able to

- know the need for green chemistry.
- understand the principles of green chemistry.
- acquire knowledge about the concept of atom economy and selectivity.
- design a green synthesis.
- apprehend microwave assisted reactions in water, organic solvents and solid state reactions.
- comprehend about ultra sound assisted reactions.

### UNIT I

Introduction-Need for green chemistry-Goals of green chemistry-Twelve principles of green chemistry. (6 Hours)

### UNIT II

Concept of atom economy -substitution, elimination, rearrangement, addition reactions-concept of selectivity- chemoselectivity, regioselectivity, enantioselectivity and diastereoselectivity-green solvents-super critical CO<sub>2</sub>, ionic liquids, water-solventless processes. (6 Hours)



### UNIT III

Designing a green synthesis- choice of starting materials, choice of reagents, choice of catalysts, choice of solvents. (6 Hours)

### UNIT IV

Microwave technology-Theory of microwave heating-Comparison between conventional and microwave heating- microwave assisted reactions- in water-hydrolysis of benzyl chloride, benzamide, methyl benzoate and oxidation of toluene- in organic solvents- Fries rearrangement, Diels-Alder reaction and decarboxylation- solid state reactions-Deprotection, saponification and synthesis of nitriles from aldehydes.

(6 Hours)

### UNIT V

Sonochemical technology- Theory- Ultra sound assisted reactions-Esterification, saponification, substitution reactions, alkylation, oxidation, reduction, coupling, cannizzaro, Strecker and Reformatsky reactions. (6 Hours)

### TEXT BOOK

1. Kumar.V.(2015).*An Introduction to Green Chemistry*. 1<sup>st</sup> Edition. Jalandhar: Vishal Publishing Co.

### REFERENCE BOOK

1.Ahluvalia, V.K.& Kidwai.(2007).*New Trends in Green Chemistry*. 2<sup>nd</sup> Edition. New Delhi: Anamaya Publishers.

Mrs.R.Nagasathya  
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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester VI	<b>GRAVIMETRIC ANALYSIS AND ORGANIC PREPARATION</b>	Hours/Week: 3	
Core Practical - 3		Credits: 3	
Course Code <b>18UCHC61P</b>		Internal 40	External 60

#### I. GRAVIMETRIC ANALYSIS

1. Estimation of lead as lead chromate
2. Estimation of barium as barium chromate
3. Estimation of calcium as calcium oxalate monohydrate
4. Estimation of copper as cuprous thiocyanate
5. Estimation of nickel as nickel dimethyl glyoxime.

#### II. ORGANIC PREPARATION

1. **Nitration:** Picric acid from phenol
2. **Bromination:** p-bromoacetanilide from acetanilide
3. **Hydrolysis:** Aromatic acid from (a) an ester (b) an amide
4. **Oxidation:** Benzoic acid from benzaldehyde.
5. **Benzoylation:** (a) Amine (b) phenols
6. **Acetylation:** (a) Amine (b) phenols

**Distribution of Marks:**

Max. Marks 100

Ext: 60 Marks

Int: 40 Marks

Record Note book - 10 marks

**Organic Preparation (15 marks)**

Procedure - 4 marks

Crude sample - 8 marks

Recrystallized sample - 3 marks

**Gravimetric Estimation (35 Marks)**

Procedure - 10 marks

Estimation - 25 marks

Error	Marks
< 2%	25
2-3 %	20
3-4 %	15
> 4%	10



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### B.Sc. CHEMISTRY (SEMESTER)

(For those who join in 2018-2019 and after)

Semester VI	<b>ORGANIC ANALYSIS AND ESTIMATION</b>	Hours/Week: 3	
Core Practical - 4		Credits: 3	
Course Code <b>18UCHC62P</b>		Internal 40	External 60

#### I. ORGANIC ANALYSIS

Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of a solid derivative - acids, phenols, aldehydes, ketones, esters, nitrocompounds, amines (primary, secondary and tertiary), amides, aliphatic diamide and monosaccharides.

#### II. ORGANIC ESTIMATION

1) Estimation of phenol

2) Estimation of aniline

#### Distribution of Marks

Max. Marks: 100

Ext: 60 marks Int: 40 marks

Record note book - 10 marks

#### Organic Estimation (25 marks)

Procedure - 10 marks

Estimation - 15 marks

[Error < 2 % - 15 marks

2-3 % -13 marks

3-4 % - 10 marks

> 4 % - 8 marks]

**Organic analysis (25 marks)**

Preliminary reaction - 2 marks

Elements present - 5 marks

Aliphatic or aromatic - 3 marks

Saturated /Unsaturated - 3 marks

Functional group - 10 marks

Derivative - 2 marks



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### B.Sc. CHEMISTRY (SEMESTER) (For those who join in 2018-2019 and after)

Semester VI	<b>PHYSICAL CHEMISTRY EXPERIMENTS</b>	Hours/Week: 2	
Core Practical - 5		Credits: 2	
Course Code <b>18UCHC63P</b>		Internal 40	External 60

1. Determination of molecular weight of given polymer by viscosity measurement.

2. Phase diagram involving

- a. Simple eutectic and
- b. Compound formation

3. Critical solution temperature

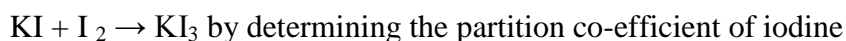
Determination of CST of phenol - water system and effect of impurity on CST -  
 strength of sodium chloride

4. Thermochemistry

Heat of solution - Ammonium oxalate – water system

5. Partition co-efficient experiments:

- a. (i) Study of the equilibrium constant for the reaction



between water and carbon tetrachloride

- (ii) Determination of strength of given KI

- b. Determination of association factor of benzoic acid in benzene.

## 6. Kinetics:

a) Determination of relative strength of acids by

i) Acid catalysed hydrolysis of ester.

b) Determination of rate constant for the Inversion of sucrose - Polarimetry

## 7. Electrochemistry

a) Conductometric Titrations:

i) Conductometric titration between an acid and a base (HCl Vs NaOH)

ii) Conductometric titration between  $\text{BaCl}_2 - \text{K}_2\text{SO}_4$ 

b) Potentiometric titrations

1.  $\text{KMnO}_4$  Vs  $\text{FeSO}_4$ 2.  $\text{K}_2\text{Cr}_2\text{O}_7$  Vs FAS

## 8. Verification of Beer-Lambert's law by Spectrophotometry

**Distribution of Marks:**

Max. marks – 100

Ext: 60

Int: 40

Record notebook	- 10 marks
Principle	- 5 Marks
For completion of the experiment	- 10 marks
Graph	- 5 marks
Calculation	- 5 marks
Tabulation	- 10 marks
Result	- 15 marks
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Total	- 60 marks
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