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Part		C	ourse	1	Semester Hours Credits Paper					Papers	Marks
I	Tamil	/ Arab	oic			I to	IV	24	12	4	400
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Total	24	24	73	-	16	24	4	10	4	1	180

## B.Sc. Chemistry with Physics and Mathematics DISTRIBUTION OF HOURS, CREDITS, NO. OF PAPERS & MARKS (Applicable for students admitted in June 2021 and onwards)

## COURSE Pattern CBCS Syllabus – B.Sc.Chemistry with Physics and Mathematics as Allied Courses (2021-22 onwards)

S	Part	art Course	Title of the nemer	Course	TT / 337	L*	Т	<b>P</b> *	6	Marks			
sem		Course	The of the paper	Code	п/w		*			Ι	Е	Т	
			இக்காலத்தமிழ்	21ULTA11									
	Ι	L-I	Basic Grammar and		6				3	25	75	100	
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	11	L-I	English -I	210LEN11	6				3	25	15	100	
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			Methodology of	0111001110	4					05		100	
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	III	A-I/1	Statistics & Calculus	21UAMA11	6	4			4	25	75	100	
			Value Education-I	21USVE1A	0	2				05		100	
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			Translation-II	210LAR21									
			Communicative		6					0-		100	
II	11	L-II	English II	210LEN21	6				3	25	75	100	
	III	DSC-III	Organic Chemistry – I	21UCCH21	4	4			4	25	75	100	
	III	DSC-IV	Physical Chemistry-I	21UCCH22	4	4			4	25	75	100	
			Preparation of Organic					2					
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			Physical Constants										
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	111	A-1/2	Differential Equations	210AMA21	0	4			4	23	75	100	
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			Inorganic Quantitative					2					
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	111	F-111	Preparation of	21000115F1	4					40	00	100/2	
			Inorganic Complexes										
	III	A-II/1	Allied Physics-I	21UAPH31	4	4			3	25	75	100	
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	111	A-11/11	Practical – I	210AF113F1	4						00	100/2	
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	IV	SEC-I	Computing and	21USFC31	1 2 2	2			2	25	75	100	
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III         D-IV         Industrial Chemical Analysis         210CCH4PI         2         2         1         40         60         100/2           III         A-II/1         Allied Physics - II         21UAPH41         4         4         3         25         75         100           III         A-II/2         Practical - II         21UAPH41         4         4         3         25         75         100           IV         SEC-III         Soft Skills         21USCH42         2         2         2         2         5         75         100           IV         SEC-IV         Processes         21USCH42         2         2         2         2         2         5         5         100           V         SEC-IV         Processes         21UFCH41         2         2         2         2         5         100           V         SOP         Sadakath Outreach Programme         21UCCH51         5         4         25         75         100           III         DSC-VII         Physical Chemistry-II         21UCCH51         4         4         25         75         100           III         DSC-IX         Spectroscopy		ш	DSC-VI	Organic chemistry – II	21UCCH41	4	4			4	25	75	100
III         P-IV         Analysis         210CCH4P1         2         -         1         40         60         100/2           III         A-II/2P         Analysis         21UAPH41         4         4         3         25         75         100           III         A-II/2P         Practical - II         21UAPH4P1         2         2         1         40         60         100/2           IV         SEC-III         Industrial Chemical Processes         21USCH42         2         2         25         75         100           V         SCA         Extra Curricular Activities         21USCH42         2         2         25         75         100           V         SOP         Sadakath Outreach Programme         1         1         100         1         100           V         SOP         Sadakath Outreach Programme         21UCCH51         5         4         25         75         100           III         DSC-VII         Physical Chemistry-II         21UCCH52         4         4         4         25         75         100           III         DSC-IX         Spectroscopy         21UCCH52         4         4         4         25 <td></td> <td></td> <td></td> <td>Industrial Chemical</td> <td>210001111</td> <td>-</td> <td><u> </u></td> <td></td> <td>2</td> <td></td> <td>20</td> <td>10</td> <td>100</td>				Industrial Chemical	210001111	-	<u> </u>		2		20	10	100
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$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		III	FW/I	Field work/Internship	21UFCH41					2			100
$ \mathbb{V} = \begin{bmatrix} \text{III} & \text{DSC-VIII} & \text{Inorganic Chemistry-III} & 21UCCH52 & 4 & 4 & 4 & 25 & 75 & 100 \\ \hline \text{III} & \text{DSC-IX} & \text{Spectroscopy} & 21UCCH53 & 4 & 4 & 4 & 25 & 75 & 100 \\ \hline \text{III} & \text{P-V} & \text{Physical Chemistry} & 21UCCH5P1 & 4 & 4 & 2 & 40 & 60 & 100/2 \\ \hline \text{III} & \text{P-VI} & \text{Chemistry of Chemistry} & 21UCCH5P2 & 4 & 4 & 4 & 2 & 40 & 60 & 100/2 \\ \hline \text{III} & \text{P-VI} & \text{Chemistry of Chemistry} & 21UCCH5P2 & 4 & 4 & 4 & 2 & 40 & 60 & 100/2 \\ \hline \text{III} & \text{DSE I-} & \text{Chemistry of Chemistry} & 21UECH51A \\ \hline \text{A/B/C} & \text{Chemistry} & 21UECH51C & & 4 & 4 & 25 & 75 & 100 \\ \hline \text{III} & \text{DSE I-} & \text{Chemistry} & 21UECH51C & & 4 & 4 & 4 & 25 & 75 & 100 \\ \hline \text{III} & \text{DSE I-} & \text{Chemistry} & 21UECH51C & & 4 & 4 & 4 & 4 & 25 & 75 & 100 \\ \hline \text{III} & \text{DSE I-} & \text{Chemistry} & 21UECH51C & & 4 & 4 & 4 & 4 & 25 & 75 & 100 \\ \hline \text{III} & \text{DSE I-} & \text{Chemistry} & 21UECH51C & & 4 & 4 & 4 & 4 & 25 & 75 & 100 \\ \hline \text{III} & \text{DSE I-} & \text{Chemistry} & 21UECH52B & 4 & 4 & 4 & 4 & 4 & 25 & 75 & 100 \\ \hline \text{III} & \text{DSC-XI} & \text{Cordination} & 21UECH52C & & & & & & & & & & & & & & & & & & &$		III	DSC- VII	Physical Chemistry-II	21UCCH51	5	5			4	25	75	100
III         DSC- IX         Spectroscopy         21UCCH53         4         4         4         25         75         100           III         P-V         Physical Chemistry Practical         21UCCH591         4         4         2         40         60         100/2           III         P-V         Physical Chemistry Practical         21UCCH5P1         4         4         2         40         60         100/2           III         P-VI         Gravimetric Estimation and Inorganic Mixture Analysis         21UCCH5P2         4         4         2         40         60         100/2           III         DSE I- A/B/C         Chemistry of Amaterials         21UECH51A         4         4         4         4         4         25         75         100           III         DSE II- A/B/C         Chemistry of Computers In Chemistry with C++         21UECH52A         4         4         4         4         25         75         100           III         DSC - XI         Medicinal Chemistry - Chemistry with C++         21UECH52C         4         4         4         25         75         100           III         DSC - XI         Organic Chemistry - III         21UCCH61         4         4 </td <td></td> <td>III</td> <td>DSC-VIII</td> <td>Inorganic Chemistry-</td> <td>21UCCH52</td> <td>4</td> <td>4</td> <td></td> <td></td> <td>4</td> <td>25</td> <td>75</td> <td>100</td>		III	DSC-VIII	Inorganic Chemistry-	21UCCH52	4	4			4	25	75	100
$ V \\ V $		III	DSC- IX	Spectroscopy	2111000453	4	4			4	25	75	100
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				Physical Chemistry	210001100		<u> </u>		4		20		100/0
$\mathbb{V} = \begin{bmatrix} \mathrm{III} & \mathrm{P} \cdot \mathrm{VI} & \begin{array}{c} \frac{\mathrm{Gravimetric}}{\mathrm{Estimation and}} \\ \mathrm{Inorganic Mixture} \\ \mathrm{Analysis} & 21\mathrm{UCCH5P2} & 4 \\ \end{array} = \begin{bmatrix} \mathrm{III} & \mathrm{P} \cdot \mathrm{VI} & \begin{array}{c} \frac{\mathrm{Gravimetric}}{\mathrm{Estimation and}} \\ \mathrm{Inorganic Mixture} \\ \mathrm{Analysis} & 21\mathrm{UECH51A} \\ \mathrm{Chemistry of} & 21\mathrm{UECH51B} \\ \mathrm{Materials} & 21\mathrm{UECH51B} \\ \mathrm{Materials} & 21\mathrm{UECH51C} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry of} & 21\mathrm{UECH51C} \\ \mathrm{Chemistry of} & 21\mathrm{UECH51C} \\ \mathrm{Materials} & 21\mathrm{UECH51C} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry of} & 21\mathrm{UECH51C} \\ \mathrm{Chemistry of} & 21\mathrm{UECH51C} \\ \mathrm{Materials} & 21\mathrm{UECH52A} \\ \mathrm{Of Analysis} & 21\mathrm{UECH52A} \\ \mathrm{Of Analysis} & \mathrm{Medicinal Chemistry & 21\mathrm{UECH52B} \\ \mathrm{Computers In} \\ \mathrm{Chemistry with C++} & 21\mathrm{UECH52C} \\ \end{array} \\ = \begin{bmatrix} \mathrm{III} & \mathrm{DSC} \cdot \mathrm{XI} & \begin{array}{c} \mathrm{Coordination} \\ \mathrm{Chemistry with C++} \\ \mathrm{Uibrary Reading Hour} & 1 \\ \mathrm{III} & \mathrm{DSC} \cdot \mathrm{XI} & \begin{array}{c} \mathrm{Coordination} \\ \mathrm{Chemistry & 21\mathrm{UCCH61} & 4 \\ \mathrm{III} & \mathrm{DSC} \cdot \mathrm{XI} \\ \end{array} \\ = \begin{bmatrix} \mathrm{MIII} & \mathrm{DSC} \cdot \mathrm{XI} & \begin{array}{c} \mathrm{Organic Chemistry -} \\ \mathrm{III} \\ \mathrm{III} \\ \mathrm{III} & \mathrm{DSC} \cdot \mathrm{XI} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry -} \\ \mathrm{III} \\ \mathrm{III} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry -} \\ \mathrm{III} \\ \mathrm{III} \\ \mathrm{P} \cdot \mathrm{VIII} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Chormatographic} \\ \mathrm{Techniques and} \\ \mathrm{Organic Sand} \\ \end{array} \\ = \begin{bmatrix} 21\mathrm{UCCH6P2} & 4 \\ \mathrm{MIII} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry -} \\ \mathrm{MIIII} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry -} \\ \mathrm{MIIII} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry -} \\ \mathrm{IIII} \\ \mathrm{Polymer Chemistry -} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry -} \\ \mathrm{IIII} \\ \mathrm{Polymer Chemistry -} \\ \mathrm{IIII} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry -} \\ \mathrm{Polymer Chemistry -} \\ \mathrm{IIII} \\ \mathrm{Polymer Chemistry -} \\ \mathrm{Polymer Chemistry -} \\ \mathrm{IIII} \\ \end{array} \\ = \begin{bmatrix} \mathrm{Polymer Chemistry -} \\ \mathrm{Polymer Chemistry -} \\ \mathrm{Polymer Chemistry -} \\ \mathrm{IIII} \\ \mathrm{Polymer Chemistry -} \\ \mathrm{Polymer Chemistry -}$			P-V	Practical	21UCCH5P1	4					40	60	100/2
$ \mathbb{V} = \begin{bmatrix} \mathrm{III} & \mathrm{P-VI} & \mathrm{Estimation and} \\ \mathrm{Inorganic Mixture} \\ \mathrm{Analysis} & 21\mathrm{UCCH5P2} & 4 \\ \mathrm{III} & \mathrm{DSE I-} \\ \mathrm{A/B/C} & \mathrm{Chemistry of} \\ \mathrm{Chemistry of} & 21\mathrm{UECH51A} \\ \mathrm{Chemistry of} & 21\mathrm{UECH51B} \\ \mathrm{Food Chemistry} & 21\mathrm{UECH51C} \\ \mathrm{IIII} & \mathrm{DSE I-} \\ \mathrm{A/B/C} & \mathrm{Instrumental Methods} \\ \mathrm{Chemistry of} & 21\mathrm{UECH52B} \\ \mathrm{Computers In} \\ \mathrm{Chemistry with C++} \\ \mathrm{IIII} & \mathrm{DSC-X} & \mathrm{Coordination} \\ \mathrm{Chemistry} & 21\mathrm{UCCH61} & 4 \\ \mathrm{III} & \mathrm{DSC-XI} & \mathrm{Coordination} \\ \mathrm{Chemistry} & 21\mathrm{UCCH61} & 4 \\ \mathrm{III} & \mathrm{DSC-XI} & \mathrm{Coordination} \\ \mathrm{Chemistry -} \\ \mathrm{III} \\ \mathrm{III} & \mathrm{DSC-XII} & \mathrm{Chemistry -} \\ \mathrm{III} & \mathrm{DSC-XII} & \mathrm{Organic Chemistry -} \\ \mathrm{III} & \mathrm{DSC-XII} & \mathrm{Organic Analysis and} \\ \mathrm{Preparation of Organic} \\ \mathrm{Chromatographic} \\ \mathrm{Compounds} & 21\mathrm{UCCH62} & 4 \\ \mathrm{III} & \mathrm{P-VIII} & \mathrm{Organic Analysis and} \\ \mathrm{Pervind} & 21\mathrm{UCCH6P1} & 4 \\ \mathrm{III} & \mathrm{P-VIII} & \mathrm{Organic Chemistry -} \\ \mathrm{III} & \mathrm{P-VIII} & \mathrm{Organic Analysis and} \\ \mathrm{Organic Chemistry -} \\ \mathrm{IIICCH6P2} & \mathrm{A} & \mathrm{A} & \mathrm{A} & \mathrm{A} \\ \mathrm{A} & \mathrm{A} & \mathrm{A} \\ \mathrm{A} & \mathrm{A} & \mathrm{A} & \mathrm{A} \\ \mathrm{A} & \mathrm{A} \\ \mathrm{A} & \mathrm{A} & \mathrm{A} \\ \mathrm{A} & \mathrm{A} \\ \mathrm{A} & \mathrm{A} & \mathrm{A} \\ \mathrm{A} \\ \mathrm{A} & \mathrm{A} \\ \mathrm{A} \\ \mathrm{A} \\ \mathrm{A} & \mathrm{A} \\ \mathrm{A} \\ \mathrm{A} \\ \mathrm{A} \\ \mathrm$				Gravimetric					4				
$\mathbb{V} = \begin{bmatrix} \operatorname{Inorganic Mixture} & \operatorname{Analysis} & & Analysis$		ш	P-VI	Estimation and	21UCCH5P2	4				2	40	60	100/2
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				Inorganic Mixture									/_
$ \mathbb{VI} = \begin{bmatrix} \operatorname{III} & \operatorname{DSE I-} & \operatorname{Chemistry of} & 210\operatorname{ECH31R} \\ \operatorname{A/B/C} & \operatorname{Chemistry of} & 210\operatorname{ECH31R} \\ \operatorname{Materials} & \operatorname{Food Chemistry} & 210\operatorname{ECH31R} \\ \operatorname{IIII} & \operatorname{DSE II-} & \operatorname{Instrumental Methods} & 210\operatorname{ECH32R} \\ \operatorname{Medicinal Chemistry} & 210\operatorname{ECH32R} \\ \operatorname{Medicinal Chemistry with C++} & 210\operatorname{ECH32R} \\ \operatorname{Library Reading Hour} & 1 & - & - \\ \operatorname{Library Reading Hour} & 1 & - & - \\ \operatorname{Library Reading Hour} & 210\operatorname{ECH32R} \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH62} \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH62} \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH63} \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH63} \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH63} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} & 210\operatorname{CH61} \\ \operatorname{Medicinal Chemistry} & 4 \\ \operatorname{Medicinal Chemistry} &$	V			Analysis Polymer Chemistry	01UECU51A								
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			DSE I-	Chemistry of	21UECH51B								
$ \begin{array}{ c c c c c } \hline \begin{tabular}{ c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		III	A/B/C	Materials	210101010	4	4			4	25	75	100
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			, -, -	Food Chemistry	21UECH51C								
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				Instrumental Methods	21UECH52A								
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			DSF II-	Of Analysis									
$ \begin{array}{ c c c c c c } \hline \begin{tabular}{ c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		III	A/B/C	Medicinal Chemistry	21UECH52B	4	4			4	25	75	100
III         DSC- XI         Coordination Chemistry         21UCCH61         4         4         4         25         75         100           III         DSC- XI         Coordination Chemistry         21UCCH61         4         4         4         25         75         100           III         DSC- XI         Physical Chemistry – III         21UCCH62         4         4         4         25         75         100           VI         III         DSC- XII         Physical Chemistry – III         21UCCH62         4         4         4         25         75         100           VI         III         DSC- XII         Organic Chemistry – III         21UCCH63         4         4         4         25         75         100           III         DSC- XII         Organic Analysis and Preparation of Organic Compounds         21UCCH691         4         4         2         40         60         100/2           III         P-VIII         Chromatographic Techniques and Green Synthesis         21UCCH6P2         4         4         2         40         60         100/2			, -, -	Computers In	21UECH52C								
IIIDSC- XCoordination Chemistry21UCCH614442575100IIIDSC- XIPhysical Chemistry - III21UCCH624442575100IIIDSC- XIPhysical Chemistry - III21UCCH624442575100IIIDSC- XIIOrganic Chemistry - III21UCCH634442575100IIIDSC- XIIOrganic Analysis and Preparation of Organic Compounds21UCCH6P14424060100/2IIIP-VIIChromatographic Green Synthesis21UCCH6P24424060100/2				Chemistry with C++		1							
III       DSC- X       Coordination Chemistry       21UCCH61       4       4       4       25       75       100         III       DSC- XI       Physical Chemistry – III       21UCCH62       4       4       4       25       75       100         VI       III       DSC- XI       Organic Chemistry – III       21UCCH62       4       4       4       25       75       100         VI       III       DSC- XII       Organic Chemistry – III       21UCCH63       4       4       4       25       75       100         VI       III       DSC- XII       Organic Analysis and Preparation of Organic Compounds       21UCCH691       4       4       2       40       60       100/2         III       P-VII       Chromatographic Techniques and Green Synthesis       21UCCH6P2       4       4       2       40       60       100/2				Coordination		1				-			
IIIDSC- XIPhysical Chemistry - III21UCCH624442575100IIIDSC- XIIOrganic Chemistry - III21UCCH634442575100IIIDSC- XIIOrganic Chemistry - III21UCCH634442575100IIIP-VIIOrganic Analysis and Preparation of Organic Compounds21UCCH6P14424060100/2IIIP-VIIIChromatographic Techniques and Green Synthesis21UCCH6P24424060100/2		III	DSC- X	Chemistry	21UCCH61	4	4			4	25	75	100
IIIDSC- XIIIIDSC- XIIIIDSC- XIIIIIDSC- XIIOrganic Chemistry - III21UCCH624442575100VIIIIDSC- XIIOrganic Chemistry - III21UCCH6344442575100IIIP-VIIOrganic Analysis and Preparation of Organic Compounds21UCCH6P14424060100/2IIIP-VIIChromatographic Techniques and Green Synthesis21UCCH6P24424060100/2				Physical Chemistry –									100
IIIDSC- XIIOrganic Chemistry - III21UCCH6344442575100IIIP-VIIOrganic Analysis and Preparation of Organic Compounds21UCCH6P14424060100/2IIIP-VIIChromatographic Techniques and Green Synthesis21UCCH6P24424060100/2			DSC- XI	III	21UCCH62	4	4			4	25	75	100
VIIIIDOC AIIIII210001004442073100VIIIIP-VIIOrganic Analysis and Preparation of Organic Compounds21UCCH6P14424060100/2IIIP-VIIIChromatographic Techniques and Green Synthesis21UCCH6P24424060100/2		TIT	DSC- XII	Organic Chemistry –	211100463	4	4			4	25	75	100
III       P-VII       Organic Analysis and Preparation of Organic Compounds       21UCCH6P1       4       2       40       60       100/2         III       P-VII       Chromatographic Techniques and Green Synthesis       21UCCH6P2       4       4       2       40       60       100/2	VI	111	DOC- AII	III	210001103	т	-			7	20	15	100
IIIP-VIIPreparation of Organic210CCH6P1424060100/2CompoundsChromatographicIIIP-VIIITechniques and21UCCH6P24424060100/2Green Synthesis	VI	111		Organic Analysis and		4			4	0	10	60	100/0
IIIP-VIIIChromatographic Techniques and Green Synthesis21UCCH6P24424060100/2		111	P-VII	Compounds	21UCCH6PI	4				2	40	60	100/2
IIIP-VIIITechniques and Green Synthesis21UCCH6P2424060100/2				Chromatographic					4				
Green Synthesis		Ш	P-VIII	Techniques and	21UCCH6P2	4				2	40	60	100/2
				i conniques anu	=100011012							00	100/2

		Emerging Trends in Chemistry	21UECH61A							
III	DSE III	Dairy Chemistry	21UECH61B	4	4		4	25	75	100
		Environmental Chemistry	21UECH61C							
III	DSE IV	Project	21UECH62	4+4*			6			100 <sup>•</sup>
IV	SEC-V	Chromatography	21USCH61	2	2		2	25	75	100
			Total	180+ 4*			140			4500

\* L – Lecture hours \* T – Tutorial hours \* P – Practical hours

\* Extra hours for Project Work outside the working hours.

\* Project Report - 60 marks, Viva-Voce Examination - 40 marks Fieldwork Report - 60 marks, Viva-Voce Examination - 40 marks

## B.Sc. Chemistry COURSE STRUCTURE (CBCS) (Applicable for students admitted in June 2021 and onwards)

#### TITLE OF THE PAPERS, CREDITS & MARKS

## **GROUP II COURSES (TWO -YEAR LANGUAGE COURSES)**

# (B.A. Arabic, B.A. Tamil, B.A. English, B.A. History, B.A. Economics, B.Sc. Mathematics, B.Sc. Physics, B.Sc. Chemistry, B.Sc. Zoology, B.Sc. Microbiology and B.Sc. Nutrition and Dietetics, B.Sc. Psychology)

SEM	CMTitle of the paperCOURSECODE				Ι	Е	Т
	PART I - TA	MIL					
I	இக்காலத் தமிழ்	21ULTA11	6	3	25	75	100
II	சமயத் தமிழ்	21ULTA21	6	3	25	75	100
III	பயன்பாட்டுத் தமிழ்	21ULTA31	6	3	25	75	100
IV	சங்கத் தமிழ்	21ULTA41	6	3	25	75	100
		TOTAL	24	12			400
	PART I – AR	ABIC					
I	Applied Grammar and Translation – I	21ULAR11	6	3	25	75	100
II	Applied Grammar and Translation – II	21ULAR21	6	3	25	75	100
III	Applied Grammar and Translation – III	21ULAR31	6	3	25	75	100
IV	Classical Prose	21ULAR41	6	3	25	75	100
		TOTAL	24	12			400
	PART II – EN	GLISH				•	
Ι	Prose, Poetry and Grammar-I	21ULEN11	6	3	25	75	100
II	Prose, Poetry and Grammar-II	21ULEN21	6	3	25	75	100
III	One – Act Plays and Writing Skill	21ULEN31	6	3	25	75	100
IV	A Practical Course in Spoken English	21ULEN41	6	3	25	75	100
		TOTAL	24	12			400

		DSC, DSE, Field work and	Project					
SEM Course			COURSE		~	]	MA	RKS
		TITLE OF THE PAPER	CODE	H/W	С	Ι	Е	Т
	DSC1	Inorganic Chemistry – I	21UCCH11	4	4	25	75	100
Ι	DSC2	Methodology of Practicals	21UCCH12	4	4	25	75	100
I	Inorganic Quantitative Analysis	21UCCH1P1	2	1	25	75	100/2	
	DSC3	Organic Chemistry – I	21UCCH21	4	4	25	75	100
	DSC4	Physical Chemistry-I	21UCCH22	4	4	25	75	100
	P-II	Preparation of Organic Compounds and Determination of Physical Constants	21UCCH2P1	2	1	25	75	100/2
	DSC5	Inorganic Chemistry – II	21UCCH31	4	4	25	75	100
ш	P-III	Inorganic Quantitative Analysis and Preparation of Inorganic Complexes	21UCCH3P1	2	1	25	75	100/2
	DSC6	Organic chemistry – II	21UCCH41	4	4	25	75	100
IV	P-IV	Industrial Chemical Analysis	21UCCH4P1	2	1	25	75	100/2
	FW/I	Field Work/Internship	21UFCH41	-	2	-	-	100
	DSC7	Physical Chemistry-II	21UCCH51	5	4	25	75	100
	DSC8	Inorganic Chemistry-III	21UCCH52	4	4	25	75	100
-	DSC9	Spectroscopy	4	4	25	75	100	
	P-V	4	2	25	75	100/2		
	P-VI	Gravimetric Estimation and Inorganic Mixture Analysis	21UCCH5P2	4	2	25	75	100/2
v		Polymer Chemistry	21UECH51A					
	DSE-I	Chemistry of Materials	21UECH51B	4	4	25	75	100
		Food Chemistry	21UECH51C					
		Instrumental Methods Of Analysis	21UECH52A					
	DSE-2	Medicinal Chemistry	21UECH52B	4	4	25	75	100
		Computers In Chemistry with C++	21UECH52C					
	DSC10	Coordination Chemistry	21UCCH61	4	4	25	75	100
	DSC11	Physical Chemistry – III	21UCCH62	4	4	25	75	100
	DSC12	Organic Chemistry – III	21UCCH63	4	4	25	75	100
	P-VII	Organic Analysis and Preparation of Organic Compounds	21UCCH6P1	4	2	25	75	100/2
VI	P-VIII	Chromatographic Techniques and Green Synthesis	21UCCH6P2	4	2	25	75	100/2
	DSE-	Emerging Trends in Chemistry	21UECH61A		л	05	75	100
	III	Dairy Chemistry	21UECH61B	+	4	23	13	100
		Environmental Chemistry	21UECH61C					
	DSE-	Project	21UECH62	4	6	_	_	100

PART III

TOTAL 89 80

2100

IV

		Part III – Alli	ed					
			COURSE	/	_	MA		RKS
SEM	COURSE	TITLE OF THE PAPER	CODE	H/W	С	Ι	E	Т
Ι	AI-1	Statistics & Calculus	21UAMA11	6	4	25	75	100
II	AI-2	Algebra and Differential Equations	21UAMA21	6	4	25	75	100
TTT	AII-1	Allied Physics- I	21UAPH31	4	3	25	75	100
111	AII-1P	Allied Physics Practical – I	21UAPH3P1	2	1	25	75	100/2
137	AII-2	Allied Physics- II	21UAPH41	4	3	25	75	100
IV	AII-2P	Allied Physics Practical – II	21UAPH4P1	2	1	25	75	100/2
			TOTAL	24	16			500
		Part IV – NM	E					
III	NME1	Applied Chemistry – I	21UNCH31	2	2	25	75	100
IV	NME2	Applied Chemistry-II	21UNCH41	2	2	25	75	100
			TOTAL	4	4			200
		Part IV – SE	С					
	SEC-1	Fundamentals of Computing and Security	21USFC31	2	2	25	75	100
111	SEC-2	Swayam - NPTEL Online Course	21USOC32	2	2	25	75	100
		Chemical Kinetics and Polarimetry	21USCH32		I	20		100
IV	SEC-3	Soft Skills	210SSS41	2	2	25	75	100
	SEC-4	Industrial Chemical Processes	21USCH42	2	2	25	75	100
V	SEC-5	Chromatography	21USCH61	2	2	25	75	100
			TOTAL	10	10			500
		Part IV –Value Educat	tion & EVS					
Т	VE VE	/alue Education-I	21USVE1A	2	2	25	75	100
_		alue Education-II	21USVE1B					
II	EVS E	Environmental Science	21UEVS21	2	2	25	75	100
			TOTAL	4	4			200

**PART – V – Extension Activities** 

ODM	Extension Activities	COURSE	TT / 337	0	I	MARKS		
9 dini	(Choose any one)	CODE	H/W	C	Ι	Е	Т	
	NCC	21UEXNCC						
	NSS	21UEXNSS						
	Physical Education	21UEXPHE						
I to IV	Red Ribbon Club	21UEXRRC		1			100	
	Youth Red Cross	21UEXYRC						
	Youth Welfare	21UEXYWL						
	Yoga	21UEXYOG						
III to	Sadakath Outreach Programme	2111EVSOD		1			100	
IV	(SOP)	210EASOF		T			100	
	Total		-	2			200	

## B.Sc. Chemistry with Physics and Biochemistry DISTRIBUTION OF HOURS, CREDITS, NO. OF PAPERS & MARKS (Applicable for students admitted in June 2021 and onwards)

Part		C	ourse			Seme	ster	Hours	Credits	Papers	Marks
I	Tamil	/ Arab	oic			I to	IV	24	12	4	400
II	Englis	h				I to	IV	24	12	4	400
	Discip + Field	line Sp 1 work	ecific & Pra	Core ctical	(DSC)	I to	VI	73	62	21	1800
III	Discip (DSE)	line Sp + Proje	ecific ect	Electi	ive	III &	VI	16	18	4	400
	Allied	Theory	7 & Pra	actica	ls	I to	IV	24	16	8	600
	Non-N	Iajor E	lective	e (NMI	E)	III to	IV	4	4	2	200
	Skill Enhancement Course (SEC)					III, I V	V & [	10	10	5	500
IV	IV Ability Enhancement Compulsory Course (AECC) Social Value Education (SVE)					Ι		2	2	1	100
	Environmental Science (EVS)					II		2	2	1	100
v	Exten	ension Activities				IV	τ		1+1		200
	Librar	y Read	ing H	our		V		1			
						то	TAL	180	140	50	4700
		SE	MEST	ER W	ISE DI	STRI	BUTI	ON OF	HOURS		
Part	I	II		I	II				IV		Total
SEM	T/A	ENG	DSC	FW	DSE/ PRO	AL	NMI	E SEC	VE/ EVS	LRH	
I	6	6	10	-	-	6	-	-	2		30
II	6	6	10	-	-	6	-	-	2		30
III	6	6	6	-	-	6	2	4	-	-	30
IV	6	6	6	-	-	6	2	4	-	-	30
v	-	-	21	_	8	-	-	-	-	1	30
VI	-	-	20	-	8	-	-	2	-		30
Total	24	24	73	-	16	24	4	10	4	1	180

## **COURSE PATTERN**

## CBCS Syllabus – B.Sc. Chemistry with Physics and Biochemistry as Allied Courses (2021-22 onwards)

Som	Part	rt Course Title of the Course Course Code H/W		т*	Т	P* C		Marks				
Sem		Course	The of the course	Course Coue	n/w	L	*	<b>F</b>	C	Ι	E	Т
			இக்காலத்தமிழ்	21ULTA11								
	I	L-I	Basic Grammar And Translation-I	21ULAR11	6	6	-	-	3	25	75	100
	II	L-I	Communicative English -I	21ULEN11	6	6	-	-	3	25	75	100
	III	DSC-I	Inorganic Chemistry – I	21UCCH11	4	4	-	-	4	25	75	100
I	III	DSC-II	Methodology of Practicals	21UCCH12	4	4	-	-	4	25	75	100
	III	P-I	Inorganic Quantitative Analysis	21UCCH1P1	2	-	-	2	1	40	60	100/2
	III	A-I/1	Biochemistry - I	21UABC11	4	4			3	25	75	100
	III	A-I/1P	Analysis Of Carbohydrates and Fatty Acids	21UABC1P1	2	-	-	2	1	40	60	100/2
	IV	AECC-I	Value Education-I Value Education-II	21USVE1A 21USVE1B	2	2	-	-	-	25	75	100
			சமயத்தமிழ்	21ULTA21								
I	I	L-II	Basic Grammar And Translation - Ii	21ULAR21	6	6	-	-	3	25	75	100
	II L-	L-II	Communicative English II	21ULEN21	6	6	-	-	3	25	75	100
	III	DSC-III	Organic Chemistry – I	21UCCH21	4	4			4	25	75	100
	III	DSC-IV	Physical Chemistry-I	21UCCH22	4	4			4	25	75	100
II	III	P-II	Preparation Of Organic Compounds And Determination of Physical Constants	21UCCH2P1	2	-	-	2	1	40	60	100/2
	III	A-I/2	Biochemistry – II	21UABC21	4	4	-	-	3	25	75	100
	III	A-I/2P	Analysis Of Amino Acids And Proteins	21UABC2P1	2	-	-	2	1	40	60	100/2
	IV	AECC-	Environmental	21UEVS21	2	2	_	_	2	25	75	100
	1.	II	Science	21011021	4	4			4	20	10	100
	I	L-III	பயன்பாட்டுத்தமிழ்	21ULTA31	6	-	-	-	3	25	75	100
			Modern Prose	21ULAR31								
	II	L-III	One-Act Plays and Writing Skill	21ULEN31	6	-	-	-	3	25	75	100
	III	DSC-V	Inorganic Chemistry – II	21UCCH31	4	4	-	-	4	25	75	100
III	III	P-III	Inorganic Quantitative Analysis and Preparation of Inorganic Complexes	21UCCH3P1	2	-	-	2	1	40	100/2	
	III	A-II/1	Allied Physics-I	21UAPH31	4	4	-	-	3	25	75	100
	III	A-II/1P	Allied Physics Practical - I	21UAPH3P1	2	-	-	2	1	40	60	100/2
	IV	SEC-I	Fundamentals of Computing and Security	21USFC31	2	2	-	-	2	25	75	100

			Swayam - NPTEL	21USOC32										
	IV	SEC-II	Online Course		2	-	-	-	2	25	75	100		
			and Polarimetry	21USCH32										
	IV	NME-I	Applied Chemistry – I	21UNCH31	2	2	-	-	2	25	75	100		
			சங்கத்தமிழ்	21ULTA41										
	I	L-IV	Classical Prose	21ULAR41	6	-	-	-	3	25	75	100		
	II	L-IV	A Practical Course In Spoken English	21ULEN41	6	-	-	-	3	25	75	100		
	III	DSC-VI	Organic Chemistry – II	21UCCH41	4	4	-	-	4	25	75	100		
	III	P-IV	Industrial Chemical Analysis	21UCCH4P1	2	-	-	2	1	40	60	100/2		
	III	A-II/1	Allied Physics- II	21UAPH41	4	4	-	-	3	25	75	100		
IV	III	A-II/2P	Allied Physics Practical – II	21UAPH4P1	2	-	-	2	1	40	60	100/2		
	IV	SEC-III	Soft Skills	21USSS41	2	2	-	-	2	25	75	100		
	IV	SEC-IV	Industrial Chemical Processes	21USCH42	2	2	-	-	2	25	75	100		
	IV	NME-II	Applied Chemistry-II	21UNCH41	2	2	-	-	2	25	75	100		
	V	ECA	Extra Curricular Activities	-	-	-	-	-	1	-	-	100		
	v	SOP	Sadakath Outreach Programme	-	-	-	-	-	1	-	-	100		
	III	FW/I	Field Work/ Internship	21UFCH41	-	-	-	-	2	-	-	100 100 100 100 100 100		
	III	DSC- VII	Physical Chemistry-II	21UCCH51	5	5	-	-	4	25	75	100		
	III	DSC- VIII	Inorganic Chemistry- III	21UCCH52	4	4	-	-	4	25	75	100		
	III	DSC- IX	Spectroscopy	21UCCH53	4	4	-	-	4	25	75	100		
	III	P-V	Physical Chemistry Practical	21UCCH5P1	4	-	-	4	2	40	60	100/2		
V	III	P-VI	Gravimetric Estimation And Inorganic Mixture Analysis	21UCCH5P2	4	-	-	4	2	40	60	100/2		
			Polymer Chemistry	21UECH51A										
	III	DSE I- A/B/C	Chemistry of Materials	21UECH51B	4	4	-	-	4	25	75	100		
			Food Chemistry	21UECH51C					$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
			Instrumental Methods of Analysis	21UECH52A										
	III	DSE II- A/B/C	Medicinal Chemistry	21UECH52B	4	4	-	-	4	25	75	100		
			Computers In Chemistry With C++	21UECH52C										
		LRH	Library Reading Hour		1	-	-	-	-	-	-	-		
	III	DSC- X	Coordination Chemistry	21UCCH61	4	4	-	-	4	25	75	100		
VI	III	DSC- XI	Physical Chemistry – III	21UCCH62	4	4	-	-	4	25	75	100		
	III	DSC- XII	Organic Chemistry – III	21UCCH63	4	4	-	-	4	25	75	100		
	III	P-VII	Organic Analysis And	21UCCH6P1	4	-	-	4	2	40	60	100/2		

		Preparation of Organic Compounds									
III	P-VIII	Chromatographic Techniques and Green Synthesis	21UCCH6P2	4	-	-	4	2	40	60	100/2
		Emerging Trends in Chemistry	21UECH61A								
III	DSE III	Dairy Chemistry	21UECH61B	4	4	-	-	4	25	75	100
		Environmental Chemistry	21UECH61C								
III	DSE IV	Project	21UECH62	4+4*	-	-	-	6	-	-	100 <sup>•</sup>
IV	SEC-V	Chromatography	21USCH61	2	2			2	25	75	100
			Total	180+ 4*				140			4600

\* L – Lecture hours \* T – Tutorial hours \* P – Practical hours

\* Extra hours for Project Work outside the working hours.

\* Project Report - 60 marks, Viva-Voce Examination - 40 marks Fieldwork Report - 60 marks, Viva-Voce Examination - 40 marks

	Part III – Allied								
			COURSE			]	MA	RKS	
SEM	COURSE	TITLE OF THE PAPER	CODE	H/W	C	I	E	Т	
Ι	AI-1	Biochemistry - I	21UABC11	4	3	25	75	100	
		Analysis Of Carbohydrates and Fatty Acids	21UABC1P1	2	1	25	75	100/2	
II	AI-2	Biochemistry – II	21UABC21	4	3	25	75	100	
		Analysis of Amino Acids And Proteins	21UABC2P1	2	1	25	75	100/2	
ттт	AII-1	Allied Physics- I	21UAPH31	4	3	25	75	100	
111	AII-1P	Allied Physics Practical – I	21UAPH3P1	2	1	25	75	100/2	
TT7	AII-2	Allied Physics- II	21UAPH41	4	3	25	75	100	
10	AII-2P	Allied Physics Practical – II	21UAPH4P1	2	1	25	75	100/2	
			TOTAL	24	16			600	

## B.Sc. Chemistry with Physics and Biochemistry as Allied Courses

## DEPARTMENT OF CHEMISTRY

## PROGRAMME: B.SC. CHEMISTRY PROGRAMME LEARNING OUTCOMES

PLO No.	Upon completion of B.Sc. Chemistry Degree Programme, the graduates will be able to:
PLO 1	Disciplinary Knowledge:
	Acquire scientific knowledge and the understanding of major
	concepts and theoretical principles.
PLO 2	Creative Thinking and Practical Skills / Problem Solving
	Skills
	Enrich skills of observation / research related skills to draw
	logical inferences from scientific experiments/ programming
	and skills of creative thinking to develop novel ideas.
	Hone problem solving skills in theoretical, experimental and
	in real life situations
PLO 3	Sense of inquiry and Skilled Communicator
1200	Develop the capability for raising appropriate questions
	relating to the current/emerging issues encountered in the
	scientific field and to plan, execute and express the results of
	experiments / investigations through technical writings as well
	as through oral presentations.
PLO 4	Ethical Awareness / Team Work / Environmental
	Conservation and Sustainability
	Equip them for conducting work as an individual / as a
	member, or as a leader in diverse teams upholding values such
	as honesty and precision and thus preventing unethical
	behaviors such as fabrication, falsification, misrepresentation
	of data, plagiarism etc to ensure academic integrity.
	Realise that environment and numans are dependent on one
	another and to know about the responsible management of our
	generation as well
PLO 5	generation as well. Usage of ICT / Lifelong Learning / Self-Directed Learning
1 20 0	Inculcate the habit of learning continuously through the effective
	adoption of ICT to update knowledge in the emerging areas in
	Sciences for inventions/discoveries and also to engage in remote /
	independent learning.

## **PROGRAMME SPECIFIC OUTCOMES**

PSO	Upon completion of B.Sc. Chemistry Degree Programme,	PLOs
No.	the students will be able to:	Mapped
PSO-1	Demonstrate knowledge of theoretical, Physical, Organic and Inorganic Chemistry and be able to apply the knowledge to analyse a variety of chemical problems.	PLO1
PSO-2	Enrich laboratory skills to carry out reactions in a Chemical laboratory, analyse the reactions and draw valid conclusions.	PLO2
PSO-3	Develop oral and written communication skills and to present results of experiments / investigations effectively.	PLO3
PSO-4	Uphold academic and professional integrity for designing, setting up and carrying out experiments independently/as a group with an understanding of chemical hazards to save the environment.	PLO4
PSO-5	Learn lifelong independently using ICT to update knowledge in current/ emerging areas.	PLO5

#### SEMESTER - I

Course Title	இக்காலத் தமிழ்
	Ikkala Tamil (Modern Tamil)
Total Hrs.	90
Hrs./Week	6
Course Code	21ULTA11
Course Type	Part – I - Tamil
Credits	3
Marks	100

**General Objective:** To introduce literary history, the basics of grammar, and the genres such as poetry, short stories and essays.

#### **Course Objectives:**

CO	The learners will be able to:									
CO-1	Understand the major literary forms such as poetry, short stories and essays and their characteristics.									
CO-2	Apply their knowledge to learn the effective use of language and literature.									
CO-3 Analyse the social / political / religious / economical issues dealt with in literary pieces.										
CO-4	Differentiate the literary forms to know their nuances.									
CO-5 Produce verses, short stories and essays.										
ക്രക	1 தமிழ்ச் செய்யுள்									
1. தமி	ழ் - பாரதியார்									
2. ц <u></u>	ய உலகு செய்வோம் - பாரதிதாசன்									
3. Doi	தனைத் தேடி - மு.மேத்தா									
4. தெ	ாலைந்து போனவர்கள் - அப்துல் ரகுமான்									
5. ஒவ்	வொரு புல்லையும் பெயர் சொல்லி அழைப்பேன் - இன்குலாப்									
6. சிசே	னகிதனின் தாழ்வான வீடு - கலாப்ரியா									
7. இன	டவெளி - மனுஷ்ய புத்திரன்									
8. சின	றச்சாலைக்காக -அறிவுமதி									
9. விழீ	விழித்தெழுக என் தேசம் - இரவீந்திரநாத் தாகூர் (ஜெயபாரதன் (மொ.பெ))									

- 10. மறதி ஈரோடு தமிழன்பன்
- 11. பெண்கவிகளின் கவிதைகள்
- 12. என்மேல் பரிவுகாட்டு என் ஆத்மாவே கலீல் ஜிப்ரான்
- 13. அந்தி மனம் கல்யாண்ஜி
- 14. நகைப்பா மாமதயானை
- 15. பியானோ- பிரமிள்
- 16. அழிவு ஆத்மாநாம்
- 17. உள் உலகங்கள் ஞானக்கூத்தன்
- 18. கிளிக்குஞ்சு ந.பிச்சமூர்த்தி
- 19. கடைசி விருந்து சுகுமாரன்
- 20. தூர் நா.முத்துக்குமார்
- 21. ஜென் கவிதைகள்
- 22. ஹைக்கூ கவிதைகள்

நீங்கள் பயின்ற புதுக்கவிதைகளின் அடிப்படையில் நவீனப் புதுக்கவிதைகள் மற்றும் ஹைக்கூக் கவிதைகள் தருக.

#### அலகு - 2 சிறுகதைகள்

- 1. மனித யந்திரம் புதுமைப்பித்தன்
- 2. அனந்தசயனம் காலனி தோப்பில் முகம்மது மீரான்
- 3. மிருகம் வண்ணநிலவன்
- 4. செடிகளுக்கு வண்ணதாசன்
- 5. கனவில் உதிர்ந்த பூ நாறும்பூநாதன்
- 6. சொர்க்கக் கன்னிகை கருணாமணாளன்
- 7. நீலம் பூக்கும் திருமடம் ஜா.தீபா
- 8. குற்றமும் தண்டனையும் லியோ டால்ஸ்டாய்

சிறுகதைகள் எழுதப் பயிற்சி அளித்து மாணவரின் சிறுகதையினைக் கல்லூரி ஆண்டு மலரில் இடம்பெறச்செய்தல்.

#### அலகு 3 அறிவுசார் கட்டுரைகள்

- 1. தொல்லியல் நோக்கில் உலகத் தமிழர் பண்பாடு
- 2. ஒங்கி ஒலித்த பெருங்குரல்; ஆத்மாநாம் கவிதைகள்
- 3. நகுலனின் தனிமை
- 4. கவிக்கோ அப்துல் ரகுமான் கவிதைகள்
- 5. இறைவனை நினைப்போம் அன்பினை வளர்ப்போம்
- 6. சுருக்கம் தேடும் விரிந்த கவிதைகள்
- 7. இலக்கியத்தில் சுற்றுச்சூழலியல்

நீங்கள் அண்மையில் பயணித்த ஓர் இடம் குறித்து இரசனையோடு எழுதுக.

#### அலகு 4 இலக்கிய வரலாறு

- 1. புதுக்கவிதை தோற்றமும் வளர்ச்சியும்
- 2. நவீனத் தமிழ்க் கவிதைகளின் புதிய போக்குகள்
- 3. தமிழ்ச் சிறுகதைகளின் தோற்றமும் வளர்ச்சியும்

#### அலகு 5 இலக்கணம் அறிமுகம்

- 1. முதலெழுத்துகள்
- 2. சார்பெழுத்துகள்
- 3. உயிர் எழுத்தின் வகைகள்
- 4. மெய் எழுத்தின் வகைகள்
- 5. சுட்டெழுத்துகள்
- 6. வினாவெழுத்துகள்
- 7. வல்லினம் மிகும் இடங்கள்
- 8. வல்லினம் மிகா இடங்கள்
- 9. பகுபத உறுப்புகள்
- 10. இலக்கணக் குறிப்புகள்

நீங்கள் வாசிக்கும் செய்தித்தாள்களில் இடம்பெறும் எழுத்துப் பிழைகளைச் சுட்டிக் காட்டுக.

#### பாடநூல்கள்

 இக்காலத்தமிழ், தமிழ்த்துறை வெளியீடு, சதக்கத்துல்லாஹ் அப்பா கல்லூரி, திருநெல்வேலி.

#### பார்வை நூல்கள்

தமிழ் இலக்கிய வரலாறு, முனைவர் சு.ஆனந்தன், கண்மணி பதிப்பகம்,

	Course Outcomes:									
СО	Upon completion of this course, students will be able to	PSOs Addressed	Cognitive Level							
CO-1	Understand the concepts behind modern poetry, short stories, essays, literary history and grammar.	1	Understanding							
CO-2	Explain the methodologies for the effective use of language and literature.	1, 2	Applying							
CO-3	Apply their knowledge to analyse the socio- political / economic / religious issues presented in the literary texts.	1,2,3,4	Applying							
CO-4	Categorize the major literary forms according to their origin and development.	1,2,3	Analysing							
CO-5	Assess the ways and means to develop the art of writing insisting on environmental conservation, social harmony and interconnectedness regionally, nationally and globally.	1,2,4,5	Evaluating							

## **Relationship Matrix**

Semester	Сот	urse Co	de	Title C	of the Course		Hou	rs	Credit 3			
I	21	ULTA1	1	Ikkal	a Tamil		90		3			
Course Outcomes	Programme Learning Outcomes Programme Specific Ou (PLOs) (PSOs)							fic Outc Ds)	omes			
(COs)	PLO 1	PLO 2	PLO :	3 PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5		
CO-1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	<b>√</b>	$\checkmark$	$\checkmark$	$\checkmark$		
CO-2	~	$\checkmark$	$\checkmark$	✓	~	~	<ul> <li>✓</li> </ul>	~				
CO-3	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	~	~	<ul> <li>✓</li> </ul>	~	~			
CO-4	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	~				
CO-5	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$		
	Numb Relati	Number of matches ( $\checkmark$ ) = 43 Relationship = <b>High</b>										

#### SEMESTER – I

Course Title	BASIC GRAMMAR AND TRANSLATION-I
Total Hrs.	90
Hrs./Week	6
Sub. Code	21ULAR11
Course Type	Part – I - Arabic
Credits	3
Marks	100

General Objective: To teach the basics of Arabic Phonetics, Grammar and Translation.

#### **Course Objectives:**

CO	The learners will be able to:
CO-1	Identify the Arabic Alphabet.
СО-2	Understand the speech sounds in Arabic.
CO-3	Explain the basic grammatical items and their uses.
CO-4	Evaluate the strategies for developing communicative competency.
CO-5	Experiment the art of speaking and writing.

#### **Unit I: Arabic for Beginners**

Lesson 1-4 (Page No. 1 to 19) The Alphabet, Vowels-Diphthong,

Nunation Doubled consonant, changing shapes of the Alphabet, Definite article

#### **Unit II: Arabic for Beginners**

Lesson-5 Parts of Speech Class room (Page No. 20,21)

Model sentences (Page No. 25)

Lesson-6 Noun-Qualified and Adjectives (Page No. 26 & 27)

Model sentences (Page No. 32,33)

Lesson-7 Gender (Page No. 34&35)

Lesson-8 Singular, Dual and Plural (Page No. 36&37)

Lesson-9 The Nominal Sentence (Page No. 38&40)

Model sentences (Page No. 44,45)

#### **Unit III: Arabic for Beginners**

Lesson-10 The possessive (Page No. 46& 47), Model sentences (Page No.51)
Lesson-11 Personal pronouns, We work (Page No. 52,53 & 54)
Model sentences (Page No.58 & 59)
Lesson-12 demonstrative and Relative pronouns, New York city (Page No. 60,61,62,& 67)
Lesson-13 Interrogatives, Conversation (Page No. 68,69 & 70)
Model sentences (Page No.74 & 75)

#### Unit IV: Al -Qirat -Al-Wazhiha Part -I

Lesson 1-7 from

#### Unit V: Al -Qirat -Al-Wazhiha Part -I

Lesson 8-14

#### **Textbooks:**

1. Syed Ali. Arabic for Beginners. UBS Publishers & Distributors Ltd. New Delhi:

(International Edition 2011)

2 Waheed Az-zaman Al-Keeranavi. Al -Qira'ath -Al-Wazhiha Part -I.

#### **Course Outcomes:**

СО	Upon completion of the course, the students	PSOs	Cognitive Level
	will be able to:	Addressed	
CO-1	Summarize the Arabic alphabet and speech sounds in Arabic.	1,2	Understanding
CO-2	Apply the basic grammar rules of Arabic in their communication.	1,2,5	Applying
CO-3	Discover the functions of Nouns, Adjectives, Personal and Demonstrative Pronouns, Prepositions, Countable and Uncountable for effective usage.	1,2,3	Applying
CO-4	Analyze the methods in order to attain communication skills.	1,2,3,5	Analyzing
CO-5	Evaluate conversational patterns and write short passages in Arabic.	1,2,4	Evaluating

## **Relationship Matrix**

Semester	Course Code			Title of the Course				ours	Cred	lits
Ι	210	J <b>LAR 11</b>	<b>IMAR</b>	AND	9	0	3			
				TRAN	ISLATI	ON-I				
Course	Pro	gramme	Learnin	g Outco	mes	Pro	gramme	e Specif	ic Outco	mes
Outcomes			(PLOs	5)				(PSO	s)	
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO
	1	2	3	4	5	1	2	3	4	5
CO-1	<ul> <li>Image: A start of the start of</li></ul>	✓			~	~	$\checkmark$			
CO-2	~	√				~	$\checkmark$			~
CO-3	~	√	~	~		~	$\checkmark$	√		
CO-4	~	~		~		~	$\checkmark$	√		√
CO-5	✓			~	√	~	√		✓	
	Number of matches ( $\checkmark$ ) = 30									
				Relationship = <b>Medium</b>						

#### SEMESTER – I

Course Title	COMMUNICATIVE ENGLISH - I
Total Hrs.	90
Hrs./Week	6
Course Code	21ULEN11
Course Type	Part – II - English
Credits	3
Marks	100

#### **General Objective:**

To teach the four skills viz. Listening, Speaking, Reading, and Writing to train the students the skills necessary for social and academic interactions.

#### **Course Objectives:**

СО	The learners will be able to:
CO-1	Understand the significance and the use of the four skills (LSRW).
CO-2	Apply the skills acquired to listen to English keenly, to understand the context clearly and to respond to others accordingly.
CO-3	Identify the strategies of language learning and use in real-life situations by means of reading extensively.
CO-4	Examine the correct and incorrect expressions in everyday English to take notes and write essays.
CO-5	Express their ideas without committing any grammatical errors.

Unit – I

- 1. Listening and Speaking
  - a. Introducing self and others
  - b. Listening for specific information
  - c. Pronunciation (without phonetic symbols)
    - i. Essentials of pronunciation
    - ii. American and British pronunciation
- 2. Reading and Writing
  - a. Reading short articles newspaper reports / fact based articles
    - i. Skimming and scanning
    - ii. Diction and tone
    - iii. Identifying topic sentences
  - b. Reading Aloud: Reading an article/report
  - c. Journal (Diary) Writing

 Study Skills - 1 Using dictionaries, encyclopedias, thesaurus Grammar in Context:

## Naming and Describing

- Nouns & Pronouns
- Adjectives

## Unit – II

## 1. Listening and Speaking

- **a**. Listening with a purpose:
- b. Effective Listening:
- c. Tonal Variation:
- d. Listening for information
- e. Asking for Information
- f. Giving Information:

## 2. Reading and Writing

- a. Strategies of Reading:
  - Skimming and Scanning
- b. Types of Reading:

Extensive and Intensive Reading

- c. Reading a prose passage
- d. Reading a poem
- e. Reading a short story

## 3. Paragraphs: Structure and types

- a. What is a Paragraph?
- b. Paragraph structure
- c. Topic Sentence
- d. Unity
- e. Coherence.
- f. Connections between Ideas: Using Transitional words and expressions.
- g. Types of Paragraphs

## 4. Study Skills II:

Using the Internet as a Resource

- a. Online search:
- b. Know the keyword:
- c. Refine your search:
- d. Guidelines for using the Resources:
- e. e-learning resources of Government of India
- f. Terms to know

## 5. Grammar in Context

Involving Action-I

- a. Verbs
- b. Concord

## Unit – III

- 1. Listening and Speaking
  - a. Giving and following instructions
  - b. Asking for and giving directions
  - c. Continuing discussions with connecting ideas

- 2. Reading and writing
  - a. Reading feature articles (from newspapers and magazines)
  - b. Reading to identify point of view and perspective (opinion pieces, editorials etc.)
  - c. Descriptive writing writing a short descriptive essay of two to three paragraphs.
- 3. Grammar in Context:

## **Involving Action – II**

- Verbals Gerund, Participle, Infinitive
- Modals

## Unit – IV

- 1. Listening and Speaking
  - a. Giving and responding to opinions
- 2. Reading and writing
  - a. Note taking
  - b. Narrative writing writing narrative essays of two to three paragraphs
- 3. Grammar in Context:

## Tense

- Present
- Past
- Future

## Unit - V

- 1. Listening and Speaking
  - a. Participating in a Group Discussion
- 2. Reading and writing
  - a. Reading diagrammatic information interpretations maps, graphs and pie charts
  - b. Writing short essays using the language of comparison and contrast
- 3. Grammar in Context: Voice (showing the relationship between Tense and Voice)

## Textbook:

Board of Editors. *COMMUNICATIVE ENGLISH* -1. Tamil Nadu State Council for Higher Education (TANSCHE). Chennai: 2020.

## References:

- 1. Radhakrishna Pillai.G,ed.Written English for You.Chennai:Emerald Publishers, 1990 (rpt2008).
- 2. Nihamathullah.A.et al. A Course in Spoken English.Tirunelveli: MSU, 2005. (rpt 2010).

	Course Outcomes		
CO No.	Upon completion of this course, students would have learned to:	PLO Addressed	Cognitive Level
CO-1	Understand the importance of language skills in order to communicate effectively.	1,2	Understanding
CO-2	Apply the listening skill to pronounce words better and to understand contextual meaning.	1,2,3	Applying
CO-3	Develop reading skill to learn vocabulary, use it appropriately, and acquire analytical skill and the like.	1,2,3,4	Applying
CO-4	Explain the nuances of common errors in English.	3,4,5	Analyzing
CO-5	Choose to use English language consciously without any errors.	1,2,4,5	Evaluating

## **Relationship Matrix**

Semester	Course Code				Title o	of the C	Hou	ırs C	Credits	
I		21ULE	N11		Com E	munica nglish -	90	)	3	
Course Outcomes (COS)	P	rogran Oute	nme Lo comes	earnir (PLO:	ng s)	Progra	mme S	pecifi (PSOs	c Out s)	comes
(000)	PLO 1	PLO 2	PLO3	PLO4	PLO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	<ul> <li>✓</li> </ul>	√				✓	✓			
CO-2	$\checkmark$	~	√			✓	$\checkmark$	$\checkmark$		
CO-3	$\checkmark$	~	~	~		✓	$\checkmark$	$\checkmark$	$\checkmark$	
CO-4	✓		~	✓	✓	√		✓	$\checkmark$	✓
CO-5	1	1		$\checkmark$	~	√	-		√	✓
	Number of matches ( <b>✓</b> ) = 34 Relationship = High									

## SEMESTER - I

Course Title	INORGANIC CHEMISTRY – I
Total Hrs.	60
Hrs./Week	4
Course Code	21UCCH11
<b>Course Type</b>	DSC-I
Credits	4
Marks	100

## General Objective:

The course focuses on atomic structure, periodic properties, chemical bonding, oxidation and reduction reactions.

### Course Objectives:

СО	The learners will be able to : :							
CO-1	Recognize the fundamentals of atoms and various theories							
001	associated with it.							
CO-2	Relate the arrangement of elements in the periodic table and							
0-2	the periodic properties.							
CO-3	Examine the nature of bonding and shapes of molecules.							
CO-4	Revise the MOT of Homo and Hetero nuclear diatomic							
	molecules.							
CO-5	Estimate an oxidation-reduction reaction based on changes in							
	oxidation numbers across the chemical changes.							

## UNIT I - Atomic Structure

Bohr Theory of Atomic Model and its limitations – Spectrum of hydrogen – Sommerfeld theory. Dual nature of electron - de - Broglie equation - verification using Davisson and Germer experiment. Heisenberg uncertainty principle and its significance – Compton Effect and photoelectric effect - Schrodinger wave equation (derivation not required)- significance of wave functions, normalization of wave function, radial and angular wave functions- Quantum Numbers and its significances - Pauli's exclusion principle, Hund's rule, Aufbau principle and its limitations

## UNIT II - Periodic Table

Long form of periodic Table –s, p, d and f block elements Variation of properties

- a) Atomic, Ionic radii and Covalent radii
- b) Ionization potential
- c) Effective nuclear charge and Shielding effect Slater's rule
- d) Electron affinity
- e) Electronegativity: Pauling's Mulliken's and Allred-Roschow's scales of electronegativity.

#### UNIT III - Chemical Bonding - I

Ionic bond - general characteristics – radius ratio rule - Lattice energy, Born-Lande equation - Madelung constant – Born Haber cycle.

Covalent bond- Valence bond theory – Heitler and London approach – Molecular orbital theory – LCAO method - Molecular orbital energy level diagrams of homo nuclear diatomic ( $N_2$ ,  $O_2$  and  $F_2$ ) and hetero nuclear diatomic (CO, NO and HF) molecules

Covalent character in ionic compounds - Polarity of covalent - Fajan's rule.

#### UNIT IV - Chemical Bonding – II

Weak chemical forces – Van der waals, Ion-dipole, dipole-dipole, induced dipole-dipole- Hydrogen bond – types and its effects

Valence Shell Electron Pair Repulsion Theory- postulates – Shape of simple molecules BeCl<sub>2</sub>, BF<sub>3</sub>,CH<sub>4</sub>, ClF<sub>3</sub>, H<sub>2</sub>O and NH<sub>3</sub>.

Hybridisation – structure of CH<sub>4</sub>, CH<sub>2</sub>= CH<sub>2</sub>, CH =CH, PCl<sub>5</sub>, SF<sub>6</sub> and IF<sub>7</sub>

#### UNIT V - Oxidation and Reduction

Electronic concept of oxidation and reduction.Oxidation number - assigning oxidation number - Redox reaction - Half reaction. Oxidant - Fe (III), hydrogen peroxide and potassium permanganate and their reduction half reaction. Reductant - Fe (II), oxalic acid and KI and their oxidation half reactions. Disproportionation reactions of  $MnO_4^2$  - in acid medium. Methods of balancing redox reactions: ion - electron and oxidation number method (only in acid medium) – Standard Electrode potential and its applications in Inorganic reactions.

#### **REFERENCE BOOKS :**

- 1. Cotton, F.A. Advanced Inorganic Chemistry. Wiley. 6th Edu. 1996
- 2. Huhee, J. Inorganic Chemistry, pearson publication, 2012.
- 3. Lee, J.D. New Concise Inorganic Chemistry. ELBS 5<sup>th</sup> Ed.2002.
- 4. Madan, R.L., et.al. *Inorganic Chemistry*. S. Chand Co., Ltd. New Delhi. 2003
- 5. Malik, U. et.al. Selected Topics in Inorganic Chemistry. S.Chand.
- 6. Puri, B.R. et.al. *Principles of Inorganic Chemistry*. Milestone publishers, New Delhi, 2007.
- 7. Sathya Prakash, G.D. et.al. *Advanced Inorganic Chemistry*. S. Chand and Company Pvt. Ltd., New Delhi, 2013.

## **COURSE OUTCOMES**

CO No.	Upon completion of the course,	PSOs	<b>Cognitive Level</b>
	the students will be able to :	Addressed	
CO-1	Explain the fundamental concept of atomic structure, atomic theories, Quantum no, long form of periodic table, chemical bonding, hybridization and oxidation- reduction number	1,3,5	Understanding
CO-2	Examine the Effective nuclear charge using slaters rule and lattice energy using Bornd-Lande equation	1,3,5	Applying
CO3	Compare MO energy level diagram of HOMO and Hetero nuclear diatomic molecule	1,3,5	Analyzing
CO-4	Predict the shapes of the molecules using VSEPR theory	1,3,4,5	Evaluating
CO-5	Formulate a balanced redox reaction	1,3,4,5	Creating

## **RELATIONSHIP MATRIX**

Semester	Course Code			Title of the Course			Ho	urs	Credits	
Ι	21	UCCH1	L	INORGANIC			6	0	4	
				CHEN	MISTR	Y - I				
Course		Progran	nme L	earning	5		Progra	mme S	Specific	3
Outcomes		Outco	omes (	PLOs)			Outc	omes (	PSOs)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓				✓	✓		✓		✓
CO-2	✓		✓		✓	✓		✓		✓
CO-3	✓	✓	✓		✓	✓		✓		✓
CO-4	✓	✓	✓		✓	✓		✓	✓	✓
CO-5	✓	✓	✓		✓	✓		✓	✓	✓
	Number of matches $(\checkmark) = 34$									
	Relationship = Low/Medium/ <b>High</b>									
	Low (If the No. of matches are less than 25)									
	Mediur	n (If the N	lo. of m	atches ar	e betwee	en 25 ar	nd 33)			
	High (I	f the No. o	of matel	hes are m	ore thar	1 33)				

#### SEMESTER – I

Course Title	METHODOLOGY OF PRACTICALS
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UCCH12
Course Type	DSC-II
Credits	4
Marks	100

#### **General Objectives:**

This course focuses on the general laboratory practices, principles and methods involved in qualitative and quantitative analysis

## **Course Objectives**:

CO	The learners will be able to :
CO-1	Understand the general laboratory safety rules
CO-2	Illustrate the principles involved in titrimetric analysis
CO-3	Examine the tests for inorganic qualitative analysis and interpret
	them
CO-4	Synthesize the principles, apparatus and mechanism of
	precipitation in gravimetric analysis.
CO-5	Explain the tests for analysing an organic compound

## UNIT I GENERAL LABORATORY PRACTICES

Understanding the details on the label of reagent Bottles – Cleaning of glass apparatus - Dilution of concentrated solution – Quantitative transfer of a substance to a graduated flask.

General chemical hazards – General laboratory safety rules – Laboratory environment - First aid measures – cuts/bleeding, burns, flammable liquid spill, fire accidents, eye accidents, chemical spill on skin.

Description of Pipette, Burette, graduated flask and their calibration.

#### UNIT II TITRIMETRIC ANALYSIS

Terminology: titrant, titrate, titration, standardisation, End point, standard solution (primary and secondary), characteristics of a primary standard solution.

Methods of expressing concentration - Normality, Molality, Molarity (with simple problems) - Molarity and normality of common acids and bases.

Types of indicators - Internal, External, Self, Adsorption.

Principles involved in volumetric analysis – acid base, precipitation, complexometric and redox (permanganometry, dichrometry, iodo and iodimetry) reactions.

#### UNIT III INORGANIC QUALITATIVE ANALYSIS

Semi-micro analysis: Apparatus used – Techniques – heating, warming, evaporation – Flames – oxidising and reducing flames – Preliminary tests - Flame test, charcoal cavity test, borax bead test -Elimination of interfering acid radicals - Chromate, borate, oxalate, fluoride and phosphate - Preparation of original solution - Group separation of basic radicals – precipitating reagents involved in group fixing and its reactions.

## UNIT IV GRAVIMETRIC ANALYSIS

Principle, requirements, Apparatus used and Mechanism of precipitation – factors affecting the solubility of precipitates - Precipitation methods - Co-precipitation and post-precipitation – Differences and prevention - precipitation from homogeneous solution - Steps involved in gravimetric analysis - solution, precipitation, filtration, drying, ignition and incineration and weighing – Estimation of Nickel and zinc.

Errors – types - accuracy and precision.

## **UNIT V ORGANIC ANALYSIS**

Preliminary examination – Nature of state, Colour, Odour, Flame test, Solubility test.

Detection of elements - Lassaigne's test for nitrogen, halogens and sulphur - Test for functional groups - Sodium bicarbonate test, Ester formation test, Neutral ferric chloride test, Libermann's test, Schiff's reagent test, Tollen's test, 2, 4 - dinitrophenyl hydrazine test, Molisch test, Seliwanoff's test, Mulliken Barker test, Diazotisation reaction (Dye test), Osazone test.

Determination of melting point and boiling point.

## **REFERENCE BOOKS**

- 1. Ghoshal Mahapatra &Nad. An advanced course in Practical chemistry: New Central Book Agency (P) Ltd.: Kolkatta, 2000.
- 2. Kamboj P.C. University Practical Chemistry: Vishal Publishing Co.: Punjab, 2010.
- 3. Mukhopadhyay R. and Chatterje P. *Advanced Practical Chemistry*: Arunabha Sen Books & Allied(P) Ltd.: Kolkata, 2007.
- 4. Svehla.Grevised *Vogel's Qualitative Inorganic Analysis*: Dorling Kindersley Pvt.Ltd.: New Delhi. 2009.
- 5. Vishnoi N.K. Advanced Practical Chemistry: Vikas Publishing House: New Delhi. 2005.
- 6. Vogel A.I. A Text Book of Practical Organic Chemistry, including Qualitative Organic Analysis : 5<sup>th</sup> edition: Longman Scientific and Technical: New York, 1989.
- Vogel's Text Book of Chemical Analysis 5<sup>th</sup> Edition, GiH.Jeffery, J.Bassett, J.Mendham, R.C.Denney, Longman Group UK Limited, 1989, ISBN 0-582-446-93-7

## **Course Outcomes**

CO	Upon completion of the course, the	PSOs	Cognitive
	students will be able to :	Addressed	Level
CO-1	Discuss the terminologies and	1,2,5	Understanding
	principles involved in titrimetric		
	and gravimetric analysis.		
CO-2	Demonstrate the general chemical	1,4,5	Applying
	hazards and use the first aid		
	measures to be carried in		
	chemistry laboratory.		
CO-3	Calculate the normality, molarity	1,2,5	Applying
	and molality of solutions.		
CO-4	Point out the tests for Inorganic	1,2,3	Analyzing
	qualitative and organic analysis		
CO-5	Verifyerrors in chemical analysis	1,2,3,5	Evaluating
	by estimating the melting point		
	and boiling point of a sample.		

## **Relationship Matrix**

Semester	Course Code		le	Title of the Course			Hours		Credits	
I	210	JCCH12	2 N C	METHO	DOLOC CTICA	ay Ls	60		4	
Course	Programme Learning Programme Specific				C					
Outcomes (COs)	PLO 1	PLO 2	D <b>mes (</b> PLO 3	PLOS) PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	<ul> <li>✓</li> </ul>	✓			✓	✓	<ul> <li>✓</li> </ul>			<ul> <li>✓</li> </ul>
CO-2	✓			✓	✓	✓			<ul> <li>✓</li> </ul>	✓
CO-3	✓	✓			✓	✓	✓			✓
CO-4	✓	✓	✓			✓	✓	✓		
CO-5	✓	1	✓		✓	<ul> <li>✓</li> </ul>	✓	✓		✓
		·	I	Number Relati	of mat ionship	ches ( = Mee	√) = 32 1ium			

### SEMESTER – I

<b>Course Title</b>	INORGANIC QUANTITATIVE ANALYSIS
Total Hrs.	30
Hrs./Week	2
<b>Course Code</b>	21UCCH1P1
<b>Course Type</b>	Practical-I
Credits	1
Marks	100/2

### **General Objective:**

This course focuses on the estimation of the concentration of compounds present in a solution by titration and to practice the calibration of burette, pipette and weighing balance.

### **Course Objectives:**

CO No.	The learners will be able to :				
CO-1	Understand the concept of different titrations and its uses.				
CO-2	Prepare solutions of known concentrations				
CO-3	Figure out the required quantity of a chemical substance				
	accurately				
CO-4	Select the best method of volumetric titration to be applied for				
	the experiment				
CO-5	Determine the type of indicator to be applied and identify the end				
	point for a given titration based on the conditions				

## I. Preparation of solutions of different normality and molarity of titrants

#### **II. Volumetric Analysis:**

Acidimetry-Alkalimetry:

- 1. Estimation of Sodium Hydroxide
- 2. Estimation of Acetic acid in commercial vinegar
- 3. Estimation of Carbonate in washing soda.
- 4. Estimation of Bicarbonate in baking soda.

#### **Permanganometry:**

- 1. Estimation of Ferrous ion.
- 2. Estimation of Oxalic acid

#### **Dichrometry:**

1. Estimation of Ferrous ion by diphenylamine as internal indicator.

2. Estimation of Ferrous ion by potassium ferricyanide as an external indicator.
## **Course Work :**

- 1. Calibration of burette, pipette and balance.
- 2. Estimation of Sodium carbonate and Sodium bicarbonate in a mixture
- by Walden's method.
- 3. Estimation of Ferrous ion and Oxalic acid in a mixture.

## **Reference Books:**

- 1. Ahluwalia, V. K., Dhingra, S., Gulati, A., *College Practical Chemistry*, Universities Press, 2005, ISBN: 9788173715068.
- Bajpai, D. N., Pandey O. P. and Giri, S., *Practical Chemistry*, S Chand & Co Ltd, 2013, ISBN: 9788121908122.
- 3. Jeffery G. H., Bassett J., Mendham J., Denneya. R C., Vogel's Text book of Quantitative Chemical Analysis, Fifth Edition, Longman Scientific and Technical, UK, 1989
- 4. Mukhopadhyay, R., Chatterjee, P., Arunabha Sen R., Advanced *Practical Chemistry*, Books & Allied(P) Ltd., Kolkata, 2007.
- 5. Nad, A.K., Mahapatra, B., Ghoshal, A., *Advanced Course in Practical Chemistry*, New Central Book Agency (P) Ltd., Kolkata, 2000.
- 6. Vishnoi, N. K., *Advanced Practical Chemistry*, Vikas Publishing House, New Delhi, 2005.

СО	Upon completion of the course, the students will be able to : :	PSOs Addressed	Cognitive Level
CO-1	Identifyprimary, secondary,link solutions and indicator.	1,2,3,4	Understanding
CO-2	Calculate the amount of carbonate and bicarbonates, ferrous ion and oxalic acid in the mixture.	1,2,3,4	Applying
CO-3	Check the quantity of carbonates, bicarbonates, acetic acid, sodium hydroxide and oxalic acid in the given sample.	1,2,3,4	Evaluating
CO-4	Estimate the amount of ferrous ion using Diphenylamine and Potassium Ferricyanide as indicators.	1,2,4	Evaluating
CO-5	Formulatestandard solutions with different concentrations.	1,2,4,5	Creating

## **Course Outcomes**

Relationship	Matrix
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Semester	Course Code			Title of the Course					irs C	redits
I	21UCCH1P1		INO	INORGANIC QUANTITATIVE						1
Course	т			AN		<u>S-I</u>	Drogra	(	Specif	30
Outcomes	_ <b>_</b>		mes (]	nes (PLOs) Programme Outcomes				omes (	(PSOs)	
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO
	1	2	3	4	5	1	2	3	4	5
CO-1	✓	$\checkmark$	✓	<ul> <li>✓</li> </ul>	✓	✓	✓	$\checkmark$	<ul> <li>✓</li> </ul>	
CO-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO-3	✓	$\checkmark$		✓	$\checkmark$	✓	✓	✓	✓	
CO-4	✓	✓		✓	$\checkmark$	✓	✓		✓	
CO-5	✓	$\checkmark$	✓	<ul> <li>✓</li> </ul>	✓	✓	✓		✓	✓
	Number of matches $(\checkmark) = 41$ .									
		Relationship = <del>Low/Medium</del> /High✓								

#### **SEMESTER - I**

Course Title	STATISTICS AND CALCULUS
Total Hrs.	90
Hrs./ Week	4
Course Code	21UAMA11
Course Type	Allied – I/1
Credits	4
Marks	100

## **General Objective:**

To understand physical science by gaining knowledge of elementary calculus and introduce various statistical tools to satisfy the need of concept personals.

# CO.NOThe learners will be able to:CO-1Recall the measures of central tendency and compute different kinds of<br/>partition algebraically and graphicallyCO-2Estimate the measures of dispersion of statistical dataCO-3EvaluateKarl Pearson's coefficients of correlation for the given dataCO-4Apply their knowledge in polar curves, pedal equation of a curve.CO-5Evaluate integrals using beta and gamma functions.

#### **Course Objectives:**

**UNIT I:** Measures of Central Tendency – simple average – Mean, Median & Mode – Geometrical mean and Harmonic mean.

**UNIT II:** Measures of dispersion range-quartile deviation-standard deviation and mean deviation – coefficient of variation.

**UNIT III:** Correlation and regression: Scatter diagram – Karl Pearson's Coefficient of Correlation – properties –Rank Correlation- lines of regression - regression coefficient and properties.

**UNIT IV:** Pedal equations - Curvature – Radius of Curvature in Cartesian, parametric & polar co-ordinates – Evolute -Circle and centre of curvature.

**Unit V:** Beta and Gamma functions.

## **Textbooks:**

1. Arumugam. S. and Issac, *Statistics*, New Gamma Publications, Palayamkottai Edition July 2013.

2. Arumugam. S. and Issac, *Calculus*, New Gamma Publications, Palayamkottai -Edition 2005.

Unit I : TB 1: Chapter II Section 2.1 - 2.4 Unit II : TB 1: Chapter III Section 3.1 Unit III :TB 1: Chapter VI Section 6.1 - 6.3 Unit IV :TB 2 Part I Chapter III Section 3.3 - 3.5 Unit V :TB 2: Part II Chapter IV

## **Reference Books:**

- 1. Gupta S.C. and Kapoor V.K. *Fundamentals of Mathematical Statistics*. Published by Sulthan Chand & Sons, New Delhi, 11<sup>th</sup> Edition.
- 2. Narayanan S. & Manicavachagam Pillay T.K.: *Calculus Volume I & II*, S. Viswanathan Printers & Publishers Pvt Ltd, Chennai, Edition 2014.

## **COURSE OUTCOMES**

со	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Define the basic terms of statistics, such as measures of central tendency and dispersion of the data.	1,2	Remembering
CO-2	Evaluate standard deviation, quartile deviation and mean deviation of the given data	1,2,3	Evaluating
CO-3	Estimate the degree of association between two variables using the concept of correlation and regression	1,2,3	Evaluating
CO-4	Solve problems in evolutes and calculate circle and centre of curvature	1,2	Applying
CO-5	Determinethe value of complicated integral using Beta and Gamma functions.	1,2.3	Evaluating

Semester	Course Code			Title of the Course				ours	Cred	lits
I	210	AMA11	St	atistics	and Ca	alculus		90	4	
Course Outcomes	Programme Learning Outcomes (PLOs)					Prog	rammo	e Speci (PSO:	fic Outc s)	omes
(COS)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	$\checkmark$	$\checkmark$			~	$\checkmark$	$\checkmark$			
CO-2	$\checkmark$	$\checkmark$	$\checkmark$		~	$\checkmark$	$\checkmark$	$\checkmark$		
CO-3	~	$\checkmark$	$\checkmark$		~	~	$\checkmark$	$\checkmark$		
CO-4	~	$\checkmark$			~	~	$\checkmark$			
CO-5	~	$\checkmark$	$\checkmark$		~	~	$\checkmark$	$\checkmark$		
	Numbe	Number of matches $(\checkmark) = 31$				Rela	ationship	o = Medi	um	

#### SEMESTER – I

Course Title	BIOCHEMISTRY – I
Total Hrs.	60
Hrs./Week	4
Course Code	21UABC11
Course Type	Allied – I/1
Credits	3
Marks	100

#### **General Objectives:**

This course emphasises on the Occurrence, classifications, reactions, structure and metabolism of carbohydrates and lipids.

#### **Course Objectives**:

СО	The learners will be able to :					
CO 1	Describe the classification, reactions, structure and					
00-1	qualitative tests of carbohydrates.					
CO-2	Discuss the major pathways of carbohydrate metabolism.					
CO-3	Examine the lipids					
Determine the fatty acids by iodine number, acid nu						
saponification value and RM value.						
CO-5	Revise the structure and functions of fatty acids					

#### UNIT I CARBOHYDRATE I

Carbohydrates – Occurrence, functions, classifications and biochemical importance – Reactions, structure and qualitative tests for glucose and fructose (structural elucidation not required) – mutarotation – epimerization – glycosides - Interconversion of monosaccharide - D - Arabinose to D - Glucose and vice - versa. D - Glucose to D - fructose and vice – versa.

#### UNIT II CARBOHYDRATE II

Disaccharides – occurrence, biochemical importance, structure, reactions and qualitative tests for maltose, sucrose and lactose (structural elucidation not required) – inversion of sucrose.

Polysaccharides – homopolysaccharides – Occurrence, structure and uses of starch and cellulose - heteropolysaccharides – composition, functions and structure of hyaluronic acid and chondroitin sulphate.

#### UNIT III CARBOHYDRATE METABOLISM

Metabolism – Basic concepts of catabolism and anabolism and its pathway.

Major pathways of carbohydrate metabolism - Embden-Meyerhof pathway (or) glycolysis, TCA cycle, gluconeogenesis, glycogenesis and HMP shunt - salient features and its reactions.

#### UNIT IV LIPIDS

Lipids – classification and functions – fatty acids – occurrence and classification – essential fatty acids – functions and deficiency – triacylglycerol – properties – determination of fatty acids – iodine number, saponification value, acid number and Reichert-Meissl (RM) number.

Cholesterol – occurrence, structure and functions.

#### **UNIT V LIPID METABOLISM**

Body fuel reserve, fatty acid oxidation -  $\beta$  oxidation - Ketone bodies, Ketogenesis - Biosynthesis of fatty acids – Palmitate, Structure of fatty acid synthase complex – functional significance, comparison between fatty acid synthesis and  $\beta$  oxidation.

#### **REFERENCE BOOKS**

- 1. Donald Voet, Judith G. Voet. *Biochemistry*, 4<sup>th</sup> edition: John Wiley & sons: New York, 2010.
- 2. Jain J.L. Fundamentals of Biochemistry, S. Chand & Co. Ltd.: New Delhi, 2005.
- 3. Kuchel P.W. and Ralstol G.B. *Biochemistry*, Schaum's Outlines, Tata McGraw Hill Publishing Company Ltd.: New Delhi, 2005.
- 4. Satyanarayana U. & Chakrapani U. *Biochemistry*, 4<sup>th</sup> edition: Elsevier: India, 2013.
- 5. Stryer L. *Biochemistry*, 5<sup>th</sup> edition: W.H. Freeman and Company: New York, 2002.
- 6. Thomas M. Delvin. *Textbook of Biochemistry*, 7<sup>th</sup> edition: John Wiley & sons: New York, 2010.

## **Course Outcomes**

СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Describe the Occurrence, functions, classifications, reactions and biochemical importance of	1,5	Understanding
CO-2	carbohydrates and lipids.Explain the basic concepts ofmetabolism, ketone bodies andketogenesis.	1,5	Understanding
CO-3	Calculate the biochemical tests (iodine number, saponification number, acid number and RM number) for purity of fatty acids	1,2,3,5	Applying
CO-4	Analyse the qualitative tests for carbohydrates	1,2,3,5	Analyzing
CO-5	Assess the pathways involved in glycolysis, TCA cycle, gluconeogenesis, glycogenesis, HMP shunt, fatty acid synthase complex and fatty acid oxidation.	1,3,5	Evaluating

Semester	Cou	rse Co	de	<b>Title of the Course</b>			Hours		Credits	
I	21	UABC1	1	BIOCH	EMIS1	TRY-I 60 3				
Course	1	Prograi	nme	Learning	g	] 1	Program	mme S	specific	:
Outcomes		Outco	omes	(PLOs)			Outco	omes (	PSOs)	
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO
	1	2	3	4	5	1	2	3	4	5
CO-1	✓				✓	✓				✓
CO-2	✓				✓	✓				✓
CO-3	1	✓	✓		✓	✓	✓	✓		✓
CO-4	✓	✓	✓		✓	✓	✓	✓		✓
CO-5	1		✓		✓	✓		✓		✓
	Number of matches ( $\checkmark$ ) = 30									
		Relationship = Medium								

#### SEMESTER – I

Course Title	ANALYSIS OF CARBOHYDRATES AND FATTY ACIDS
Total Hrs.	30
Hrs./Week	2
Course Code	21UABC1P1
Course Type	Allied Practical-I/1P
Credits	1
Marks	100/2

## General Objectives:

This course emphasizes on the identification, estimation of carbohydrates and acid number, saponification number and iodine number of oil.

## **Course Objectives**:

CO	The learners will be able to :
CO-1	Distinguish mono, di and polysaccharides
CO-2	Calculate the amount of glucose present in the sample
CO-3	Determine the acid number of oil
CO-4	Examine the fatty acid
CO-5	Assess the saponification number and iodine number of oil

## I Qualitative analysis of carbohydrates

- 1. Analysis of monosaccharides glucose and fructose.
- 2. Analysis of disaccharides Maltose, lactose and sucrose.
- 3. Analysis of polysaccharides Starch

## II Quantitative analysis

- 1. Estimation of glucose by colorimetric method.
- 2. Estimation of acid number of oil.
- 3. Estimation of fatty acids

## Course Work

- 1. Estimation of saponification Value of oil.
- 2. Estimation of iodine number of oil.

## **REFERENCE BOOKS**

- 1. Geetha Damodaran. *Practical Biochemistry*: Jaypee Brothers Medical Publishers (P) Ltd.: New Delhi, 2011.
- 2. Jeyaraman J. Laboratory Manual in Biochemistry: New Age International Publishers: India, 2011.
- 3. Mary Vijaya T., Mani M.L., Sunitha Kumari K. &AshaK.R.T. *Practical Clinical Biochemistry Manual*, Rishi Publications: Kalikavilai, 2003.
- 4. Palanivelu D.R. Laboratory manual for Analytical Biochemistry & Separation Techniques: School of Biotechnology, Madurai Kamaraj University: Madurai. 2000.

	Course Outcom	es	
СО	Upon completion of the course, the students will be able to : :	PSOs Addressed	Cognitive Level
CO-1	Distinguish mono- , di- and poly saccharides.	1,2	Understanding
CO-2	Examine glucose, fructose, maltose, lactose, sucrose, starch and cellulose.	1,2,3	Applying
CO-3	Investigate the amount of glucose present in the sample.	1,2,3,4	Analyzing
CO-4	Measure the acid number, saponification value and iodine number of oil.	1,2,3,4	Evaluating
CO-5	Estimate the fatty acids.	1,2,3,4	Evaluating

Semester	Course Code		•	Title of the Course					Cre	Credits		
I	21UA	BC1P1		ANALYSIS OF				30		1		
			C	ARBOH	IYDRA <sup>4</sup>	TES AI	<b>ID</b>					
				FATTY AC								
Course	] ]	Programme Learning					Programme Specific					
Outcomes		Outco	omes (	PLOs)			Outc	omes (I	PSOs)			
(COs)	PLO	PLO	PLO	PLO	PLO	<b>PSO</b>	PSO	PSO	PSO	PSO		
	1	2	3	4	5	1	2	3	4	5		
CO-1	✓	✓				✓	✓					
CO-2	✓	✓	✓			<ul><li>✓</li></ul>	✓	✓				
CO-3	✓	✓	✓	✓		✓	✓	✓	✓			
CO-4	✓	✓	✓	✓		✓	✓	✓	✓			
CO-5	✓	✓	✓	✓		✓	✓	✓	✓			
				Numbe	r of ma	tches (	√) = 34	ŀ		.4		
				Rel	lationsl	nip = H	igh					

#### SEMESTER – I

Course Title	VALUE EDUCATION-1
Total Hrs.	30
Hrs./Week	2
Course Code	21USVE1A
Course Type	AECC-I
Credits	2
Marks	100

**General Objective:** To make students inculcate moral values, leading to faith and righteous action in their life.

Unit – I:Islam – Meaning – Importance – A complete Religion – The religion accepted by
God – Five Pillars of Islam – Kalima – Prayers – Fasting – Zakat – Haj. Iman – Monotheism
– Angels – Books – Prophets – Dooms Day – Life after death – Heaven and Hell.

Unit – II:Quran – The Book of Allah – Wahi – Revelation to Prophet Muhammad(sal) – Compilation – Preservance – Structure – Content – Purpose – Source of Islamic Law– SuraFathiha, Kafirun, Iqlas, Falakh and Nas.

Unit – III:Hadith – Siha Sitha – Buhari – Muslim – Tirmithi – Abu Dawood – Nasai – Ibn Maja – Collection of Hadith – Meaning of 40 Hadith.

Unit – IV:Life History of Prophet Muhammad (sal) – AiamulJahiliya – Prophet's Childhood and Marriage – Prophethood – Life at Mecca – Life at Medinah – Farewell Address – Seal of Prophethood.

**Unit** – V:Good character – Etiquettes – Halal and Haram – Duties towards Allah – Duties towards fellow beings – MasnoonDuas.

## **Textbooks:**

## Publication of SadakathullahAppa College

#### **Reference Books:**

- 1.V.A. Moahmed Ashrof Islamic Dimensions Reflection and Review on Quranic Themes.
- 2. The Presidency of Islamic Researchers Revised & Edited The Holy Quran.
- 3.M. ManzoorNomani Islamic Faith & Practice.
- 4. Ali Nadawi, Abul Hasan- Muhammad Rasulullah., Muassasathus Sahafawa Nashr

publication Lucknow, India, 1999.

- 5.K. Ali A Study of Islamic History.
- 6.Abdul Rahuman Abdulla
  - h Islamic Dress code for Women.
- 7.Dr. MunirAhamed Mughal Code For Believers.
- 8. Abdul Malik Mujahid Gems and Jewels.

#### SEMESTER - I

Course Title	VALUE EDUCATION-11
Total Hrs.	30
Hrs./Week	2
Course Code	21USVE1B
Course Type	AECC-I
Credits	2
Marks	100

#### UNIT I

Individual Morality – Objective of Moral life – Living in accordance with the code of Morality – the goodness of Morality – Morality and *Thirukural*- The need for faith.

#### UNIT II

Adherence to higher code of Morality – Fear of God – Good Moral Values – Duty to Parents – Teacher, respecting elders – Moral Etiquettes – Right-minded Principle – High Principles for Proper conduct.

#### UNIT III

Inculcating good attitudes – Open mindedness – Morale – analysing the pros and cons of good and bad – Service to others – Mind Power, tolerance, respecting others, showing love to others, patience – tranquility – Modesty, kindness and forgiveness.

#### UNIT IV

Quotations and moral Stories expressing Good characters of Great personalities – Life History of Great people: Mahatma Gandhi, Abraham Lincoln, Dr. A.P.J. Abdul Kalam.

#### UNIT V

Truth, the importance of uprightness, integrity, friendship – Health awareness on Alcohol and drug abuse – inculcating reading habit – reading good books – Hygiene – Dowry – Corruption.

#### **TEXTBOOKS:**

Publication of Sadakathullah Appa College.

SEMESTER – II					
Course Title	சமயத்தமிழ்				
	<b>Religious Tamil or Tamil and Religion</b>				
Total Hrs.	90				
Hrs./Week	6				
Course Code	21ULTA21				
Course Type	Part – I - Tamil				
Credits	3				
Marks	100				

**General Objective:** To expose students to the tenets of all the religions.

Course Objectives:						
СО	The learners will be able to:					
CO-1	Understand religions and their objectives by means of the literary texts prescribed.					
CO-2	Classify the tenets, concepts and rituals of various religions.					
CO-3	Choose to know about the concept of virtues necessary for society through literature of ethics.					
CO-4	Devise strategies to get through competitive exams.					
CO-5	Consider focussing on their skill development by gaining confidence.					

## அலகு – 1

## சைவம்

1.	அ. திருஞானசம்பந்தர்	- தோடுடைய செவியன்
		- என்ன புண்ணியம் செய்தனை (2.106.1)
		- ஊனத் திருள்நீங் கிட (1.38.3)
ஆ.	திருநாவுக்கரசா்	- மாசில் வீணையும்
		- குனித்த புருவமும் கொவ்வைச்
		- புழுவாய்ப் பிறக்கினும்
<b>9</b> .	சுந்தரமூர்த்தி நாயனார்	- பித்தா பிறைசூடி
		- பொன்னார் மேனியனே
2.	மாணிக்கவாசகர்-திருவாசகம்	- வானாகி மண்ணாகி
	திருவெம்பாவை	- முன்னைப் பழம்பொருட்கும்
3.	திருமூலா்-திருமந்திரம்	- உள்ளம் பெருங்கோயில்

#### வைணவம்

4.	அ. பொய்கையாழ்வார் - பாலன் தனதுருவாய் ஏழுலகுண்டு
	ஆ) பூதத்தாழ்வார் - சென்ற திலங்கைமேல்
	இ) பேயாழ்வார் - அடைந்த தரவணைமேல் ஐவர்க்காய்
	ஈ) நம்மாழ்வார் - உண்ணும் சோறு
	உ) மதுரகவியாழ்வார் - கண்ணி நுண்சிறுத்
5.	ஆண்டாள்-திருப்பாவை - மார்கழித் திங்கள்
	சமணம்
6.	யசோதர காவியம் (கடவுள் வாழ்த்து) - நல்லார் வணங்கப் படுவான்
	நீலகேசி (கடவுள் வாழ்த்து)
	பௌத்தம்
7.	மணிமேகலை (பாத்திரம் பெற்ற காதை) - மாரனை வெல்லும் வீரநின் (59-72)
	கிறித்தவம்
8.	இரட்சணிய யாத்திரிகம் (கடவுள் வாழ்த்து) - 1. மூல காரண முதற்பொருள்
	- 2. ஆதி மெய்த்திரு
	- 3. வானமும், பூமியும்
	இஸ்லாம்
9.	உமறுப்புலவர் - அல்லாஹ்
10.	சதாவதானி செய்குதம்பிப் பாவலர் - மாண்டசவம் ஒன்றெடுத்து
	(நபிகள் நாயக மான்மிய மஞ்சரி) - ஒன்று தெய்வம் ஒன்று மதம்
	இரகுமான் கண்ணி
11.	குணங்குடி மஸ்தான் சாகிபு 1) ஈறும் முதலுமற்றே இயங்குகின்ற முச்சுடராய்க்
	காணிக்கை வைத்தேனென் கண்ணே றகுமானே-2
	2) ஏகப் பெருவெளியில் இருட்கடலிற் கம்பமற்ற
	காகமது வானேன் கண்ணே நகுமானே — 7
	3) வேட்டை பெரிதென்றே வெறிநாயைக் கைப்பிடித்து
	காட்டிற் புகலாமோ கண்ணே றகுமானே — 22
	4) இன்றுள்ளோர் நாளைக் கிருப்பதுபொய்
	யென்பதையான் கண்டுகொண்டேன் ஐயாவென்
	கண்ணே நகுமானே - 37
	5) எட்டிப் பிடிக்கும் இதமறிந்தா லுன்பதத்தைக்
	கட்டிப் பிடித்திடுவேன் கண்ணே நகுமானே – 49
12.	ஞானமாமேதை தக்கலை பீர்முகம்மது அப்பா - அலைகடலும் அம்புலியும்
	- பொல்லாக்குபிர்களும் வருங்

13. இறையருட்கவிமணி பேராசிரியர்
 கா.அப்துல்கபூர்
 அலகிலா அருளும் அளிவிலா..

#### நீதி இலக்கியம்

14.	திருக்குறள்	-	உழவு (1031-1040)
15.	நாலடியார்	-	கல்வி கரையில கற்பவர் நாள்சில 135
16.	நான்மணிக்கடிகை	-	நாற்றம் உரைக்கும் மலர் 45

#### அலகு – 2

#### புதினம்

வாடிவாசல் - சி.சு. செல்லப்பா, காலச்சுவடு, நாகர்கோவில்

## அலகு – 3

#### உரைநடை

#### (போட்டித் தேர்வுகளுக்குக் கட்டுரை எழுதும் பயிற்சி)

- 1. நபிகள் நாயகம் (ஸல்) அன்பின் தாயகம்
- 2. சதக்கத்துல்லாஹ் அப்பா அவர்களின் வாழ்வும் பணியும்
- 3. பண்பெனப்படுவது பாடறிந்து ஒழுகுதல்
- 4. நம்பிக்கையோடிருப்போம்
- 5. தமிழின் தொன்மையும் சிறப்பும்
- 6. தடம் பதித்த தமிழ் நாவலாசிரியர்கள்

#### அலகு – 4

## இலக்கிய வரலாறு

#### (போட்டித் தேர்வுத் தயாரிப்பு)

- 1. சைவம், வைணவம், கிறித்தவம், இசுலாம், வளர்த்த தமிழ்
- 2. புகழ்பெற்ற தமிழ் நூல்கள், நூலாசிரியர்கள்
- 3. சாகித்ய அகாதெமி விருது பெற்ற படைப்புகள்

## அலகு – 5

## தமிழ்நாடு அரசுப் பணியாளர் தேர்வாணையம் நடத்தும் போட்டித் தேர்வுக்குரிய பொதுத்தமிழ் இலக்கணப் பகுதி ஓர் அறிமுகம்

- 1. வேர்ச்சொல்லைக் கண்டறிதல்
- 2. பெயரெச்சம், வினையெச்சம், முற்றெச்சம் பற்றி அறிதல்
- 3. வினைமுற்று, ஏவல் வினைமுற்று அறிதல்
- 4. வியங்கோள் வினைமுற்று, வினையாலணையும் பெயர்
- 5. வினைத்தொகை, பண்புத்தொகை அறிதல்

- 6. உவமைத்தொகை, உம்மைத் தொகை அறிதல்
- 7. வேற்றுமைத் தொகையைக் கண்டறிதல்
- 8. அன்மொழித் தொகையைக் கண்டறிதல்
- 9. இரட்டைக்கிளவி, அடுக்குத்தொடர் அறிதல்

#### பாடநூல்:

சமயத்தமிழ், சதக்கத்துல்லாஹ் அப்பா கல்லூரித் தமிழ்த்துறை வெளியீடு,

## பார்வை நூல்

சமயம் வளர்த்த தமிழ், வேங்கடசாமி நாட்டார், பாவைப் பதிப்பகம், சென்னை

#### **Course Outcomes:** Upon completion of this course, students will be **PSOs** CO **Cognitive Level** Addressed able to CO-1 Understand the doctrines, divine 1,3,4,5 Understanding thoughts and virtues of the various religions. CO-2 Develop impeccable spoken and written 1,4,5 Applying languge ability. CO-3 Choose to improve their confidence and 1,4 Applying the nuances of governance by reading the history of great personalities. CO-4 Explain the ancient Tamil people's life 3,4,5 Analyzing history. CO-5 Summarize great literary works and to 1,2 Evaluating get substance from them to attract employment opportunites.

Semester	Сот	ırse Coo	de	Title Co	of the urse			Hour	s	Cre	dit
II	21	ULTA2	1	சமய	த்தமிழ்			90		3	
Course Outcomes	Prog	ramme	Lear: (PLC	ning Outc Ds)	omes	P	og	ramme	Speci: (PSOs	fic Outc	omes
(COs)	PLO 1	PLO	PLO	3 PLO 4	PLO 5	PSC	) 1	PSO 2	PSO 3	PSO 4	PSO 5
		2									
CO-1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$
CO-2	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$				$\checkmark$	$\checkmark$
CO-3	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$				$\checkmark$	
CO-4	$\checkmark$	$\checkmark$	$\checkmark$						$\checkmark$	$\checkmark$	$\checkmark$
CO-5	$\checkmark$	$\checkmark$				$\checkmark$		$\checkmark$			
	Number of matches ( $\checkmark$ ) = 31 Relationship = Medium										

#### SEMESTER - II

Course Title	BASIC GRAMMAR AND TRANSLATION-II
Total Hrs.	90
Hrs./Week	6
Sub. Code	21ULAR21
Course Type	Part –I - Arabic
Credits	3
Marks	100

**General Objective:** To make the students develop the intermediate Arabic Grammar and Translation skills.

#### **Course Objectives:**

СО	The learners will be able to:
CO-1	Understand the parts of speech of Arabic to comprehend text books in terms of the sentences given.
CO-2	Differentiate the conjugations of verbs in Arabic.
CO-3	Explain the various predicates in Arabic sentences.
CO-4	Illustrate the morphology in Arabic grammar.
CO-5	Analyze nominal sentences in Arabic.

#### **Unit I: Arabic for Beginners**

Lesson-14 Prepositions, The village (Page No. 76& 77)

Lesson-15 Verbal sentence – The past tense (Page No. 82 to 87)

Lesson-16 The Imperfect tense- The River Nile (Page No. 93 to 97)

Lesson-17 The Imperative and Negative command (Page No. 102 to 104)

## Unit II: Al -Qirat –Al-Wazhiha Part –I

Lesson 15-21

#### **Unit III: Arabic for Beginners**

Lesson-20 The verbs of Incomplete predicate (Page No. 126 to 130)

Lesson-21 Inna and its categories, the banks (Page No. 136,137) Lesson-22 the Numerals, Days and months (Page No. 144 to 148) Lesson-24 اسم التفضيل (Page No. 151)

#### Unit IV: Al -Qirat –Al-Wazhiha Part –I

Lesson 22-28

#### Unit V: Al -Qirat –Al-Wazhiha Part –I

Lesson 29-35

#### **Text and Reference books**

1) Arabic for Beginners (selected topics only)

By Dr. Syed Ali (Former HOD of Arabic, The New College, Chennai.

(UBS Publishers & Distributors Ltd) 5, Ansari Road, New Delhi -110 002.

2) Al -Qirat –Al-Wazhiha Part –I, From Lesson 15 to 35 only.

by Waheed Az-zaman Al-Keeranavi.

Available at: Al-Manar Book Depot, Mannarpuram, Trichy-20.

#### **Course Outcomes**

CO	Upon completion of the course, the students	PSOs	Cognitive
	will be able to	Addressed	Level
CO-1	Understand the intermediate Arabic grammar.	1,2,3	Understanding
CO-2	Apply the functions of verbs such as the past tense, the imperfect tense etc. in sentences.	1,2,4	Applying
CO-3	Produce sentences in Arabic with the grammar rules.	1,4,5	Applying
CO-4	Categorize the different particles in Arabic.	1,2,3	Analyzing
CO-5	Find errors in Arabic sentences with the rules of grammar and translate Arabic texts.	1,4,5	Evaluating

Semester	Cour	se Code		Title of the Course				Hours		C	redits
II	21ULAR 21		B	BASIC GRAMMAR AND			90			3	
				TRAN	SLATI	ON-II					
Course	Pro	gramme	Learnin	g Outco	mes	Pro	gram	me Specific Outcomes			
Outcomes			(PLOs)					(1	PSOs)		
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSC		PSO	PSO	PSO
	1	2	3	4	5	1	2		3	4	5
CO-1	✓	$\checkmark$	✓	✓	✓	✓	٢		✓		
CO-2	✓	$\checkmark$	✓	✓		✓	v			√	
CO-3	✓	$\checkmark$	✓			✓				√	✓
CO-4	<		✓	✓	✓	✓	١		✓		
CO-5		√			✓	✓				√	<ul> <li>✓</li> </ul>
	Number of matches = 33										
		Relationship = Medium									

## SEMESTER – II

Course Title	COMMUNICATIVE ENGLISH - II
Total Hrs.	90
Hrs./Week	6
Course Code	21ULEN21
Course Type	Part – II - English
Credits	3
Marks	100

## General Objective:

To teach students the four skills viz. Listening, Speaking, Reading, and Writing and to impart language skills through basic grammatical categories.

## **Course Objectives:**

СО	The learners will be able to:
CO-1	Understand the importance of real-life situations, as responding to complaints and to use language effectively.
CO-2	Generalize the nuances and methods of giving short speeches, proposing welcome address and vote of thanks and the like.
CO-3	Associate themselves with learning to give short presentations, formal presentations and writing e-mails.
CO-4	Apply their knowledge in writing sentences with grammatical order, writing brochure and understanding texts in context.
CO-5	Develop their knowledge and skills to use clauses and collocations appropriately in spoken and written contexts.

## Unit – I

## Listening and Speaking

- a. Listening and Responding to Complaints (formal situation)
- b. Listening to Problems and Offering Solutions (informal)

## **Reading and Writing**

- a. Reading Aloud (brief motivational anecdotes)
- b. Writing a Paragraph on a Proverbial Expression / Motivational Idea

## Word Power / Vocabulary

- a. Synonyms and Antonyms
- Grammar in Context

- Adverbs
- Prepositions

## Unit – II

## Listening and Speaking

a. Listening to Famous Speeches and Poems

b. Making Short Speeches - Formal:

Welcome Speech and Vote of Thanks.

Informal Occasions - Farewell Party, Graduation Speech

## **Reading and Writing**

a. Writing Opinion Pieces (could be on travel, food, film / book reviews

or on any contemporary topic)

b. Reading Poetry

i. Reading Aloud: (Intonation and Voice Modulation)

ii. Identifying and using figures of speech-simile, metaphor, personification etc.

## Word Power

a. Idioms and Phrases

## Grammar in Context

Conjunctions and interjections

## Unit – III

## Listening and Speaking

- a. Listening to Ted Talks
- b. Making Short Presentations Formal Presentation with PPT,

Analytical Presentation of Graphs and Reports of Multiple Kinds

c. Interactions during and after the Presentations

## **Reading and Writing**

- a. Writing Emails of Complaint
- b. Reading Aloud Famous Speeches

## Word Power

a. One word Substitution

## Grammar in Context:

• Sentence Patterns

## Unit – IV

## Listening and Speaking

- a. Participating in a Meeting: face to face and online
- b. Listening with Courtesy and adding ideas and giving opinions

during the meeting and making concluding remarks

## **Reading and Writing**

- a. Reading Visual Texts Advertisements
- b. Writing a Brochure

## Word Power

a. Denotation and Connotation

## Grammar in Context:

• Sentence Types

## Unit - V

## Listening and Speaking

- a. Informal Interview for Feature Writing
- b. Listening and Responding to Questions at a Formal Interview

## **Reading and Writing**

- a. Writing Letters of Application
- b. Reader's Theatre (Script Reading)

c. Dramatizing Everyday Situations / Social issues through Skits. (writing scripts and performing)

## Word Power

a. Collocation

## Grammar in Context:

• Working with Clause

## Textbook:

COMMUNICATIVE ENGLISH-II. Tamil Nadu State Council for Higher Education (TANSCHE).2020.

## **References:**

- 1. RadhakrishnaPillai.G,ed.Written English for You.Chennai: Emerald Publishers,1990 (rpt2008).
- 2. Nihamathullah.A.et al. A Course in Spoken English, Tirunelveli: MSU,2005. (rpt 2010).

## **Course Outcomes**

CO	Upon completion of this course,	PLO	Cognitive
No.	students will be able to:	Addressed	Level
CO-1	Distinguish the various real life	1,2	Understanding
	situations to use language accordingly.		
CO-2	Experiment giving short speeches,	1,2,3	Applying
	welcome address, vote of thanks in		
	programmes and functions organised.		
CO-3	Write e-mails and give short	1,2,3,4	Applying
	presentations, formal presentations		
	using the English language.		
CO-4	Order sentences with its basic units	1,2,3,4	Analyzing
	and to prepare brochures etc.		
CO-5	Find errors in the correct use of	1,2,3,4,5	Evaluating
	collocations and clauses in everyday		
	spoken and written communication.		

Semester	Cours	e Cod	e	Tit	le of t	he Cou	ırse	Ho	ours	Credits
II	21UI	EN21	C	OMMU	NICA'	rive e II	H 9	90	3	
Course	Pro	ogram	me L	earnin PLOs)	g		Program	mme	Speci	ific
(COS)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PS0 4	PSO 5
CO-1	$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$			
CO-2	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$		
CO-3	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$	
CO-4	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$	
CO-5	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	✓	$\checkmark$
	Number of matches $(\checkmark) =36$ Relationship = High									

#### SEMESTER – II

<b>Course Title</b>	ORGANIC CHEMISTRY – I
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UCCH21
<b>Course Type</b>	DSC-III
Credits	4
Marks	100

#### General Objective:

This course concentrates on naming of organic compounds, polar effects, reaction intermediates, stereochemistry of organic compounds, reactivity of active methylene compounds and conformational analysis.

#### **Course Objectives:**

CO	The learners will be able to :
CO-1	Understand the classification and nomenclature of organic
	compounds
00.0	Demonstrate the class of reactive intermediates involved in
CO-2	organic reactions
CO-3	Draw the different stereochemical forms of organic compounds
CO 4	Detect the polar effects influencing the reactivity of organic
CO-4	compounds
	Speculate the active methylene carbon, its properties and
CO-5	illustrate the conformational analysis on different organic
	compound structures.

#### **UNIT I - IUPAC nomenclature and types of reactions:**

Organic Compounds- Functional groups – Classification -Cyclic and acyclic compounds-Naming of Organic Compounds- Trivial and derived names- Rules of IUPAC system of nomenclature for organic compounds -Reaction mechanism- polar and non- polar bonds -Notations in organic chemistry – curved arrow, fish-hook arrow, straight arrow.

Types of reagents- nucleophiles, electrophiles, ambident ions - homolytic and heterolytic cleavage of a covalent bond.

Addition, Substitution and Elimination reactions with examples [No reaction mechanism]

#### UNIT II - Polar effects & Reaction intermediates

Polar effects: Inductive effect, electromeric effect, mesomeric effect, hyper - conjugation and steric effect and their influence on the acidity and basicity of organic compounds

Reaction intermediates: Formation, stability and structure of carbonium ions, carbanions, free radicals, nitrenes and carbenes

## **UNIT III – Stereochemistry**

Optical isomerism - optical activity - elements of symmetry - Optical activity of lactic acid, tartaric acid. Enantiomers and diastereomers racemic and meso forms - Racemization - Resolution of racemic mixtures, Walden inversion - Asymmetric synthesis. Chirality - achiral molecules - meaning of (+) and (-), D and L notations. Projection formulae - Fischer, Flying wedge, Sawhorse and Newmann Projection formulae, Cahn - Ingold and Prelog rule - R, S - notation (with one and two asymmetric carbon atoms).

Geometrical isomerism – cis-trans isomerism, maleic acid and fumaric acid, Aldoxime and ketoxime. - E - Z notation. Methods of distinguishing geometrical isomers.

## UNIT IV - Active methylene compounds and Tautomerism

Active methylene compounds: Reactivity of methylene hydrogen preparation and synthetic uses of diethyl malonate, ethyl acetoacetate, and ethyl cyanoacetate.

Tautomerism - various types - keto - enol, amido – imido, nitro – acinitro and oxime-nitroso - evidences in favour of each form and mechanism of inter conversion –differences between tautomerism and resonance.

## UNIT V - Cycloalkane, conformational analysis and Aromaticity

Cycloalkane: Nomenclature - General methods of preparations, properties - Baeyer's strain theory - Postulates, evidences and – limitations -Sachse - Mohr theory.

Conformational analysis: Ethane, n-Butane, Ethylene glycol and Cyclohexane.

Aromaticity: Huckel's rule - examples for Aromatic, non-aromatic, anti-aromatic - examples for benzenoid and non - benzenoid compounds (tropylium and cyclopropenyl ion). - Aromatic sextet theory based on resonance and MO theory.

#### **Reference Books:**

- 1) Bansal R. K., *Organic Reaction Mechanism*, McGraw hill publishing company New Delhi, 2005.
- 2) Eliel E. L., *Stereochemistry of carbon compounds*, Tata McGraw Hill Publishing Company, 2005.
- 3) Finar I. L, *Organic Chemistry Vol. I and II*, Sixth ed, Addison Wesley Longman Ltd., England, 1996.
- 4) Gosh S. K., *Advanced General Organic Chemistry*, New Central Book Agency, Kolkata, 2005.
- 5) Gurtu J. N. and Kapoor R., *Organic Reactions and Reagent*, 2004, S. Chand and company, New Delhi.
- 6) Jain M.K., and Sharma S.C., *Modern Organic Chemistry, Vishal Publishing Co.*, Jalandhar, 2017 ISBN: 978-81-932934-9-2
- 7) Jagdamba Singh and Yadav L.D.S., *Organic Synthesis*, Pragati Prakashan, Meerut, 2007.
- 8) Michael B. Smith and Jerry March, *March's Advanced Organic Chemistry Reactions, Mechanisms, And Structure*, Sixth edition, Wiley-Inter science A John Wiley & Sons, Inc., Publication., 2016. ISBN 13: 978-0-471-72091-1.
- 9) Tewari N., *Advanced Organic Reactions Mechanism*, Books and Allied (P) LTD, Kolkata, 2005.
- 10) Wade Jr L. G., Organic Chemistry, Eighth Edition, Pearson Education, Inc. USA, 2013, ISBN 978-0-321-76841-4 (0-321-76841-8).

11) William Carruthers and Iain Coldham, *Modern Methods of Organic Synthesis*, Fourth Edition, Cambridge University Press, 2004.

	Course Outcomes								
CO	Upon completion of the course, the students	PSOs	Cognitive						
	will be able to :	Addressed	Level						
CO-1	Describe classification, nomenclature, polar effects and reactive intermediates involved with organic compounds and different strain theories on stability	1,5	Understanding						
CO-2	Sketch the organic reaction mechanism and different forms of stereochemical structures.	1,5	Applying						
CO-3	Categorize the cyclic and acyclic compounds, geometrical isomers and different tautomeric structures	1,5	Analyzing						
CO-4	Differentiate the types of reagents, reactive intermediates and aromatic compounds from non-aromatic compounds	1,3,5	Analysing						
CO-5	Construct the conformational structures for ethane, butane, ethylene glycol and cyclohexane.	1,3,4,5	Evaluating						

Semester	Cour	se Code	e	Title of the Course				Hours	6 C1	edits
II	21U	CCH21	OR	ORGANIC CHEMISTRY - I 60						
Course		Program	nme Le	ne Learning Programme Specific						С
Outcomes		Outco	omes (l	PLOs)			Out	comes (	PSOs)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓		✓		✓	✓				✓
CO-2	✓	✓	✓		✓	✓				<ul> <li>✓</li> </ul>
CO-3	✓		✓		✓	✓				✓
CO-4	1	✓	✓		✓	✓		✓		<ul> <li>✓</li> </ul>
CO-5	✓	✓	✓		✓	<ul> <li>✓</li> </ul>		✓	✓	<ul> <li>✓</li> </ul>
			N	lumber	of mat	tches (	√) = 3	31		
				Rela	ationsh	ip = H	igh			
						-	-			

#### **SEMESTER – II**

Course Title	PHYSICAL CHEMISTRY-I
Total Hrs.	60
Hrs./Week	4
Course Code	21UCCH22
Course Type	DSC-IV
Credits	4
Marks	100

#### **General Objective:**

The course focuses on chemical properties of matter, concepts of electrolyte and thermodynamics.

#### **Course Objectives:**

CO	The learners will be able to :
CO-1	Understand the concept of gaseous state
CO-2	Illustrate the various forms of solid state compounds
CO-3	Analyze the electrolytes, pH, Buffer and salt hydrolysis
CO-4	Assess the basic concepts of colloids and adsorption isotherms
CO-5	Formulate the various concepts of thermodynamics

#### UNIT I- GASEOUS STATE

Kinetic molecular model of a gas - Postulates and derivation of kinetic gas equation

Maxwell's law of distribution of velocities (derivation) - graphical representation and its significance - Collision diameter - collision number collision frequency - mean free path – Viscosity of gases and effect of temperature and pressure on coefficient of viscosity - Problem.

Effect of temperature on distribution of molecular velocities - types of molecular velocities. Relation between  $C_{rms}$ ,  $C_{mpv}$ .  $C_{av}$ .

Degrees of freedom of a gaseous molecule - Principle of equipartition of energy - Calculation of specific heat ratio for monoatomic, diatomic and polyatomic molecules  $-H_2O$ ,  $O_3$  and  $CO_2$ .

#### **UNIT II - SOLID STATE AND LIQUID CRYSTALS**

Amorphous solids, crystalline solids, types and its characteristics -Types of packing - HCP, CCP - voids. X- ray diffraction - Bragg's law - rotating crystal method and powder pattern method

Structure of diamond, graphite, NaCl, CsCl, Sphalerite and Wurtzite.Crystal defects - Point defect - Schottky and Frenkel defect - Metal excess and metal deficiency defects - Crystal growth from gel method.

Liquid crystals - Smectic, Nematic and Cholesteric types-Applications.

#### UNIT III - IONIC EQUILIBRIUM

Electrolyte: Strong, moderate and weak electrolytes degree of ionization, factors affecting degree of ionization, ionization constant - ionic product of water - Ionization of weak acids and bases.

pH scale – Common ion effect - Buffer solutions - Henderson equation, Buffer Range, Buffer capacity and applications.

Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for Salt of strong acid vs weak base, Strong base vs weak acid and weak acid vs weak base.

## UNIT IV - COLLOIDS AND SURFACE CHEMISTRY

Colloids –Brownian movement - coagulation of colloids - Hardy Schulze law - protective colloids - gold number - Hoffmeister series -

Gels - Classification, preparation and properties. Emulsion - types - emulsifiers - surfactants and types.

Adsorption - Factors influencing adsorption - Physisorption and Chemisorption - Freundlich adsorption isotherm and Langmuir adsorption isotherms - Derivation - BET isotherm (derivation not required) - Adsorption Indicators - Applications of adsorption.

## **UNIT V - INTRODUCTION TO THERMODYNAMICS**

System: closed, open and isolated - Surroundings

Properties: Intensive and extensive variables - State function and Path function - Exact and Inexact differentials - Euler's rule of reciprocity

Processes: Reversible, Irreversible, Adiabatic, Isothermal, Isobaric, Isochoric.

Thermodynamic equilibrium - Absolute Temperature - Zeroth law of Thermodynamics.

Mathematical statement of First law - Concept of heat (q), work (w), internal energy (U), and statement of first law, enthalpy (H), relation between  $C_p$  and  $C_v$ , Kirchhoff's equations - Adiabatic flame temperature - explosion temperature.

#### **REFERENCE BOOKS**

- 1. Puri, Sharma, Pathania, *Principles of Physical Chemistry*, 46<sup>th</sup>Edition; VishalPublishers: New Delhi, 2012
- 2. Arun Bahl, BahlB.S., TuliG.D., *Essentials of Physical Chemistry*,28<sup>th</sup> Edition; S. Chand& Company Ltd: New Delhi, 2020.
- 3. Anthony R. West, Solid State Chemistry and its Applications, 2<sup>nd</sup> Edition; John Wiley & Sons: New Delhi, 2014.

- 4. Atkins, Paula, James *Physical Chemistry*, 11<sup>th</sup> Edition; Oxford University press: United Kingdom, 2018.
- 5. Rajaram J, Kuriacose J.C., *Chemical Thermodynamics: Classical, Statistical, Irreversible*, Pearson Education: India, 2013.

СО	Upon completion of the course, the	PSOs	Cognitive
	students will be able to :	Addressed	Level
CO-1	Understand the concept of gaseous state	1,3	Understanding
CO-2	Explain the various forms of solid state compounds	1,2,3,4	Understanding
CO-3	Illustrate the electrolytes, pH, Buffer and salt hydrolysis	1,2,3,4	Applying
CO-4	Infer the basic concepts of colloids and adsorption isotherms	1,3,4,5	Analyzing
CO-5	Compare the various concepts of thermodynamics	1,3,4,5	Evaluating

## **Course Outcomes**

Semester	Cour	se Co	de	Title of	Cours	e	Hours		Credits			
II	21U0	CH22	; F	Physica	mistry	7 -I	60		4			
Course	P	rogra	mme I	Learnir	ıg	Prog	<b>Programme Specific Outcomes</b>					
Outcomes		Outc	omes	es (PLOs)			(PSOs)					
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	✓		✓			✓		✓		✓		
CO-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CO-3	✓	✓	✓	✓		✓	✓	✓		✓		
CO-4	✓		✓	<ul> <li>✓</li> </ul>		✓		✓		✓		
CO-5	✓		✓	<ul> <li>✓</li> </ul>	✓	<ul> <li>✓</li> </ul>		✓		✓		
Number of matches ( $\checkmark$ ) = 38												
Relationship = High												

## SEMESTER - II

Course Title	PREPARATION C	OF ORGANIC	COMPOUNDS	AND
	DETERMINATION (	OF PHYSICAL CO	DNSTANTS	
Total Hrs.	30			
Hrs./Week	2			
Course Code	21UCCH2P1			
Course Type	Practical-II			
Credits	1			
Marks	100/2			

General Objective: To gain knowledge of preparing organic compounds

CO	The learners will be able to :
CO-1	Elaborate the physical constants of organic compounds
CO-2	Demonstrate the Preparation of organic compounds and their derivatives
CO-3	Classify Recrystalization and purity of organic compounds
CO-4	Verify the reactions of organic compounds
CO-5	Deduct the mechanism of formation of organic compounds

## **Course Objectives:**

## 1. Determination of melting point/ boiling point.

## 2. Preparation of Organic Compounds Hydrolysis:

- 1. Preparation of benzoic acid from benzamide
- 2. Preparation of salicylic acid from methyl salicylate. **Benzoylation:**
- 3. Preparation of Phenyl benzoate from phenol. **Oxidation:**
- 4. Preparation of benzoic acid from benzaldehyde. **Bromination:**
- 5. Preparation of p-bromoacetanilide from acetanilide. **Condensation:**
- 6. Preparation of osazone from glucose **Nitration:**
- 7. Preparation of picric acid from phenol **Diazotisation:**
- 8. Preparation of methyl orange from sulphanilic acid

## **Course Work :**

- 1. Calibration of thermometer
- 2. Crystallization using water, alcohol and water-alcohol mixture.
- 3. Draw the organic structure using chemsketch/Gchem paint.

## **REFERENCE BOOKS :**

- 1. Ahluwalia, et.al., V.K. *College Practical Chemistry*. Universities Press (India) Private Ltd., Hyderabad.2005
- 2. Ghoshal et.al. Advanced Course in Practical Chemistry. New Central Book Agency (P) Ltd., Kolkata 2000;
- 3. Monograph on Green Chemistry Laboratory experiments, Green Chemistry Task Force Committee, DST.
- 4. Mukhopadhyay, R., et.al. *Advanced Practical Chemistry*. Arunabha Sen, Books & Alied (P) Ltd., Kolkata. 2007
- 5. Vishnoi, N.K. Advanced Practical Chemistry. Vikas Publishing House, New Delhi. 2005
- 6. Vogel, AI. A textbook of practical organic chemistry. Pearson education, India.

<u> </u>	Upon completion of the course, the	PSOs	Cognitive	
	students will be able to :	Addressed	Level	
CO-1	Demonstrate the principles of organic preparation	1,2,3,4	Understanding	
CO-2	Classify the different organic reactions for organic compounds	1,2,3,4,5	Applying	
CO-3	Check the purity of organic compounds	1,2,3,4	Analyzing	
CO-4	Analyze the organic compounds	1,2,3,4	Analyzing	
CO-5	Determine the melting point and boiling point of the product	1,2,3,4	Evaluating	

#### **Course Outcomes**

Semester	Cours	se Code		Title of the Course					s Cr	Credits		
II	21UC	CH2P1	PREI	PREPARATION OF ORGANIC						1		
				COMP	OUNDS	S AND						
			PH	IYSICA	L CON	STAN	TS					
Course		Progran	nme Le	me Learning Progr					amme Specific			
Outcomes		Outco	mes (I	mes (PLOs)				omes (	PSOs)			
(COs)	PLO	PLO2	PLO	PLO	PLO	PS	PSO	PSO	PSO	PSO		
	1		4	5	01	2	3	4	5			
CO-1	✓	✓	√	✓		✓	✓	✓	✓			
CO-2	✓	✓	✓	✓		✓	✓	✓	✓	✓		
CO-3	✓	✓	√	✓		✓	✓					
CO-4	✓	✓	✓	✓		✓	✓	✓	✓			
CO-5	✓	✓	✓	✓		✓	✓	✓	✓			
	Number of matches ( $\checkmark$ ) = 39(High)											
	Relationship = Low/Medium/High											

#### SEMESTER II

<b>Course Title</b>	ALGEBRA AND DIFFERENTIAL EQUATIONS
Total Hrs.	90
Hrs./ Week	6
Code	21UAMA21
Course type	Allied-I/2
Credits	4
Marks	100

## **General Objective:**

To provide a new and refined approach in studying abstract mathematical relationships through new symbolism and to solve the differential equation of higher order.

CO.NO	The learners will be able to:
CO-1	Understand the techniques for solving algebraic equations.
CO-2	Define reciprocal equations and discuss their types
CO-3	Explain the algorithm ofNewton's and Horner's method to find the approximate solutions of numerical equations
CO-4	Solve first order higher degree differential equations.
CO-5	Determine the type of linear differential equation.

**Course Objectives:** 

**UNIT I:** Theorems on theory of Equation – Relation between roots and coefficients – Symmetric functions of roots in terms of coefficients.

**UNIT II:** Transformation of Equations – Reciprocal Equations.

**UNIT III:** Approximate solutions of numerical equations using Newton's method and Horner's method.

**UNIT IV:** First order higher degree Differential equations - Solvable for p, x and y- Clairaut's form

**UNIT V:** Linear differential equation with constant coefficients- particular integrals of the form  $f(x) e^{ax}$ ,  $x^n$ .

## **Textbooks:**

Joseph A. Mangaladoss, S. Firthous Fatima, M. HimayaJaleela Begum and Dr. Syed Ali Fathima: *Classical Algebra*, Presi – Persi Publications, Tirunelveli, Edition 2016.

Arumugam S.and Issac: *Differential Equations & Applications*, New Gamma Publication, Palayamkottai, Edition 2008.

Unit I : **TB 1:** Chapter I: Section 1.1, 1.2 & Chapter II: Section 2.1.

Unit II : TB 1: Chapter II: Section 2.2 & Chapter IV: Section 4.1-4.4

Unit III : **TB 1:** Chapter V: Section 5.1, 5.2

Unit IV : **TB 2**: Chapter I: Section 1.7

Unit V : **TB 2:** Chapter II: Section 2.3

## **Reference Books:**

1. Arumugam. S. and Issac, *Algebra*, New Gamma Publications, Palayamkottai, Edition 2011.

2. Joseph A. Mangaldoss, *Differential Equation & Vector Calculus*, Presi – Persi Publications, Tirunelveli 2012

## **COURSE OUTCOMES**

со	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the fundamental concepts of algebra.	1,2	Understanding
CO-2	Find the solution of Reciprocal equations.	1,2,3	Remembering
CO-3	Solve numerical equations using Newton's and Horner's methods.	1,2,3	Applying
CO-4	Solve differential equations that are in Clairaut's form.	1,2	Applying
CO-5	Evaluate the solution of the linear differential equation of the form $f(x) e^{ax}$ , $x^n$ .	1,2	Evaluating

Semester	Cour	se Cod	e	Title of the Course					rs	Credits	
II	21U	AMA21		ALGEBRA AND						4	
			DIF	<b>FERE</b>	TIAL	EQUA1	TIONS				
Course		Progra	mme L	earnin	g	Programme Specific					
Outcomes		Outc	omes (	PLOs)			Outc	omes (	omes (PSOs)		
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSC	PSO	
	1	2	3	4	5	1	2	3	4	5	
CO-1	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$				
CO-2	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			
CO-3	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			
CO-4	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$				
CO-5	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$					
	Numl	ber of n	natches	s() = 2	29		Rela	ationsh	ip = N	Aedium	
Course Title	BIOCHEMISTRY-II										
--------------	-----------------										
Total Hrs.	60										
Hrs./Week	4										
Course Code	21UABC21										
Course Type	Allied-I/2										
Credits	3										
Marks	100										

#### **General Objectives:**

This course focuses on amino acids, proteins, nucleic acids, enzymes and clinical biochemistry

#### **Course Objectives**:

CO	The learners will be able to :
CO-1	Classify amino acids and discuss the reactions.
CO-2	Demonstrate the types of nucleic acids.
CO-3	Differentiate between DNA and RNA
CO-4	Assess the mechanism of enzymes and different types of enzyme inhibitors.
CO-5	Propose the types, symptoms and diagnosis of diabetes

#### UNIT I AMINO ACIDS AND PROTEINS

Amino acids – Classifications based on structure, polarity, nutrition and metabolic fate, Properties - Optical activity, isoelectric point & zwitter ion - Reactions due to amino and carboxylic acid group, Action of heat on alpha, beta and gamma amino acids – functions.

Triplet code for 20 amino acids.

Proteins – classification based on functions, chemical nature, solubility and nutritive value – properties – colour reactions – primary structure – determination - Secondary, tertiary and quarternary structure of proteins

#### UNIT II AMINO ACID METABOLISM

Transamination – salient features – Deamination – oxidative and nonoxidative deamination – decarboxylation - Urea cycle.

Metabolism of glycine, tyrosine, tryptophan - Kynurenine and Serotonin pathway – Melatonin, Serotonin and its functions.

#### UNIT III NUCLEIC ACIDS

Nucleic acids – Types, components – purine, pyrimidine derivatives, nucleoside and nucleotide – functions.

DNA structure – Watson – Crick model – RNA –types (mRNA, tRNA and rRNA) - structure of tRNA.

Comparison between DNA and RNA.

#### UNIT IV ENZYMES

Enzymes - Nomenclature - Classification - Factors affecting the enzyme activity - Michaelis - Menten equation - Derivation - Enzyme specificity – active site – mechanism of enzyme action – Lock and key model - Enzyme inhibition - Reversible, Irreversible and Allosteric - Coenzymes -Industrial and Medical applications of enzyme.

#### **UNIT V CLINICAL BIOCHEMISTRY**

Composition of blood – blood grouping – determination of blood group and matching - Blood pressure – hypertension – determination -Determination of glucose in serum – Folin and Wu's method - Determination of serum cholesterol – Sackett's method.

Estimation of glucose in urine - Diagnostic test for sugar in urine - Benedict's test - clinistix - strip test - Diagnostic test for salts in urine and serum.

#### **REFERENCE BOOKS :**

- 1. Donald Voet, Judith G. Voet. *Biochemistry*, 4<sup>th</sup> edition: John Wiley & sons: New York, 2010.
- 2. Jain J.L. Fundamentals of Biochemistry, S. Chand & Co. Ltd.: New Delhi, 2005.
- 3. Jayashree Ghosh, *A Textbook of Pharmaceutical Chemistry*, 3<sup>rd</sup> revised edition, S.Chand Publishers, New Delhi, 2003.
- 4. Kuchel P.W. and Ralstol G.B. *Biochemistry*, Schaum's Outlines, Tata McGraw Hill Publishing Company Ltd.: New Delhi, 2005.
- 5. Satyanarayana U. & Chakrapani U. *Biochemistry*, 4<sup>th</sup> edition: Elsevier: India, 2013.
- 6. Stryer L. *Biochemistry*, 5<sup>th</sup> edition: W.H. Freeman and Company: New York, 2002.
- 7. Thomas M. Delvin. *Textbook of Biochemistry*, 7<sup>th</sup> edition: John Wiley & sons: New York, 2010.

# **Course Outcomes**

CO	Upon completion of the course, the	PSOs	Cognitive
	students will be able to :	Addressed	Level
CO-1	Describe the Classification,	1,5	Understanding
	properties and reactions of amino		
	acids and proteins		
CO-2	Explain the structure of proteins,	1,3,5	Understanding
	DNA and RNA		
CO-3	Derive Michaelis-Menten equation	1,3,5	Applying
	and point out the industrial and		
	medical applications of enzymes.		
CO-4	Examine the metabolism of amino	1,3,5	Analyzing
	acids and pathways involved in		
	urea cycle		
CO-5	Estimate the clinical profile of	1,2,3,5	Evaluating
	blood and urine.		

Semester	Cour	Course Code		Title of the Course			Hour	'S	Cred	lits
II	21U	ABC21	BI	OCHEN	<b>IISTR</b>	<b>Y</b> -	60		3	
				II	[					
Course	Programme Learning Programm			mme \$	e Specific					
Outcomes		Outco	omes (l	PLOs)			Outc	omes	(PSOs)	
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO
	1	2	3	4	5	1	2	3	4	5
CO-1	✓				✓	<ul><li>✓</li></ul>				<ul><li>✓</li></ul>
CO-2	<ul> <li>✓</li> </ul>		✓		✓	✓		✓		✓
CO-3	✓		✓		✓	✓		✓		✓
CO-4	<ul> <li>✓</li> </ul>		✓		✓	✓		✓		<ul> <li>✓</li> </ul>
CO-5	<ul> <li>✓</li> </ul>	✓	✓		✓	✓	<ul> <li>✓</li> </ul>	✓		<ul> <li>✓</li> </ul>
			N	umber Relati	of mat onship	ches = Me	$\overline{(\checkmark)} = 30$	)	-	

Course Title	ANALYSIS OF AMINO ACIDS AND PROTEINS
Total Hrs.	30
Hrs./Week	2
Course Code	21UABC2P1
Course Type	Allied Practical-I/2P
Credits	1
Marks	100/2

### **General Objectives:**

This course concentrates on the detection of amino acids and estimation of amino acids, proteins and sugar level in urine and blood.

#### **Course Objectives**:

CO	The learners will be able to :
CO-1	Analyse amino acids by qualitative tests
CO-2	Investigate colour reactions of proteins
CO-3	Examine amino acids
CO-4	Estimate Proteins
CO-5	Detect sugar in blood and urine

# I Qualitative analysis of amino acids

1. Analysis of tyrosine, tryptophan, arginine, histidine, cysteine and methionine

2. Colour reaction of proteins.

# II Quantitative analysis

- 1. Estimation of glycine.
- 2. Estimation of Protein by Biuret method.
- 3. Estimation of aminoacids by colorimetric method.

# **Course Work :**

- 1. Detection of sugar in urine.
- 2. Detection of sugar in blood.

# **REFERENCE BOOKS :**

- 1. Geetha Damodaran. *Practical Biochemistry*: Jaypee Brothers Medical Publishers (P) Ltd.: New Delhi, 2011.
- 2. Jeyaraman J. Laboratory Manual in Biochemistry: New Age International Publishers: India, 2011.
- 3. Mary Vijaya T., Mani M.L., Sunitha Kumari K. &AshaK.R.T. *Practical Clinical Biochemistry Manual*, Rishi Publications: Kalikavilai, 2003.
- 4. Palanivelu D.R. Laboratory manual for Analytical Biochemistry & Separation Techniques: School of Biotechnology, Madurai Kamaraj University: Madurai. 2000.

# **Course Outcomes**

CO	Upon completion of the course, the	PSOs	Cognitive
	students will be able to :	Addressed	Level
CO-1	Differentiate the colour reactions of proteins	1,2,3,4	Understanding
CO-2	Explore tyrosine, tryptophan, arginine, histidine, cysteine and methionine	1,2,3,4	Applying
CO-3	Examine the amino acids by colorimetric method	1,2,4	Analyzing
CO-4	Evaluate sugar in blood and urine	1,2,4,5	Evaluating
CO-5	Estimate Protein and glycine	1,2,4	Evaluating

Semester	Cours	se Code	1	Title of the Course				Hours	Cre	edits
II	21UABC2P1		A	ANALYSIS OF AMINO				30		1
			AC	IDS AN	ID PRC	DTEIN	S			
Course	1	Progran	nme Le	earning	S		Progra	umme S	Specifi	C
Outcomes		Outco	omes (l	PLOs)			Outo	omes (	PSOs)	
(COs)	PLO	PLO	PLO	PLO	PLO	PS	PSO	PSO	PSO	PSO
	1	2	3	4	5	01	2	3	4	5
CO-1	✓	✓	✓	✓		✓	✓	✓	✓	
CO-2	✓	✓	✓	✓		✓	✓	✓	✓	
CO-3	✓	✓		✓		✓	✓		✓	
CO-4	✓	✓		✓	✓	✓	✓		✓	✓
CO-5	✓	✓		✓		✓	✓		✓	
	Number of matches ( $\checkmark$ ) = 36									
	Relationship = High									
						-	-			

Course Title	ENVIRONMENTAL SCIENCE
Total Hrs.	30
Hrs./Week	2
Course Code	21UEVS21
Course Type	AECC-II
Credits	2
Marks	100

#### SEMESTER - II

#### **UNIT - I: Nature of Environmental Studies**

Goals, Objectives and guiding principles of environmental studies. Towards sustainable development - Environmental segments-Atmosphere, Hydrosphere, Lithosphere, Biosphere – definition. Pollution episodes -- Hiroshima - Nagasaki, - Bhopal gas Tragedy, Fukushima. Stone leprosy in Taj Mahal, Minamata disease.

#### **UNIT - II: Natural Resources**

Renewable and Non-Renewable resources - classification.

- Forest resources: Use and over exploitation, Afforestation and deforestation.
- Water resources: Use and over utilization and conservation of surface and ground water - Rain harvesting.
- Marine Resources: Fisheries and Coral reefs.
- <u>Mineral resources</u>: Use and exploitation environmental impacts of extracting and using mineral resources.
- Food resources: Effects of modern agriculture fertilizers pesticide problem.
- Energy resources: Growing energy needs use of alternate energy source - Solar cells & wind mills.
- ➢ Land resources: Land degradation

#### UNIT - III: Ecosystem

- Concept of Eco-systems Tropic level, food chains, food web and Ecological pyramids, Living conditions on other planets (Brief account). Types, structure & Functions, prevention and control of pollution of the following:
- a) Aquatic ecosystem
- b) Terrestrial ecosystem Grassland, Forest and Desert ecosystem

### UNIT - IV: Biodiversity & Its Conservation

Introduction - Definition: ecosystem diversity, species diversity and Genetic diversity. Hot spots of biodiversity - Western Ghats, Eastern Himalayas and Gulf of Mannar. Threats to biodiversity - Habitat Loss, Poaching of wildlife and Man - wildlife conflicts. Nature reserves. Conservation of biodiversity: In-situ and Ex-situ, Environmental movements – Green peace and Chipco movement. Biodiversity law.

# UNIT - V: Environmental protection, Policies and practices

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.

Prevention, Control of Pollution and Environmental Laws:

- > Water, Air and Noise (prevention & Control of Pollution) Act.
- Environmental Protection Act.
- Wildlife production Act, Forest Conservation Act, International agreements, Monstreal and Kyoto protocols and conservation on biological Diversity. The Chemical Weapons Convention (CWC)
- > Role of Central & State Pollution Control Boards.

Field work : 5 marks

Visit to an area to document environmental assets: river/ forest / fauna.

or

Visit to a local polluted site-urban/rural/Industrial / Agricultural

or

Study of common plants, insects, birds and basic principles of identification

# **REFERENCE BOOKS:**

- 1. Basic of Environmental Science. Vijayalakhmi, Murugesan and Sukumaran Manonmaniam Sundaranar University publications.
- Environmental Studies. John de Brito, Victor, Narayanan and Patric Raja
   published by St. Xavier's College, Palayamkottai, 2008.
- 3. Environmental Science and Biotechnology. A.G. Murugesan and C. Raja Kumar MJP Publishers.
- 4. Fundamental of Environmental pollution Krishnan Kannan Chand & Company Ltd., New Delhi, 1997.
- 5. Environmental Studies. S. Muthiah, Ramalakshmi publications, Tirunelveli.
- 6. EnRole of central and state pollution control boards. Environmental Studies. V.M. Selvaraj, Bavani Publications, Tirunelveli.

Course Title	பயன்பாட்டுத் தமிழ் (Payanpattu Tamil)
Total Hrs.	90
Hrs./Week	6
Course Code	21ULTA31
Course Type	Part – I - Tamil
Credits	3
Marks	100

General Objective: To teach the Sangam literature.

#### **Course Objectives:**

СО	The learners will be able to:
CO-1	Understand Sangam Tamil through the texts prescribed.
CO-2	Describe the speciality of love, valour, charity in Tamil tradition.
CO-3	Choose life's rules and regulations through literature.
CO-4	Determine to increase self confidence.
CO-5	Prioritize to learn modern skills such computer operation.

#### அலகு 1

. 1.	சிலப்பதிகாரம்	- வழக்குரை காதை
2.	மணிமேகலை	- பாத்திரம் பெற்ற காதை
3.	சீவகசிந்தாமணி	- சீவகனுக்கு விசயை கூறிய அறிவுரை
4.	பெரிய புராணம்	- சிறுத்தொண்டர் நாயனார் புராணம்
5.	கம்பராமாயணம்	- கங்கை காண் படலம்
6.	இயேசு காவியம்	- பாரச்சிலுவை
7.	சீறாப்புராணம்	- விட மீட்ட படலாம்
சிற்றில	க்கியங்கள்	
1.	முக்கூடற்பள்ளு	- ஆற்று வளமும் மீன் வளமும்
2.	திருக்குற்றாலக் குறவஞ்சி	- ഥത്സെ ഖന്ദ്രങ്ങങ
இக்கா	லக் காப்பியம்	
1.	நாயகம் ஒரு காவியம்	- பாம்பின் நேசமும் தோழரின் பாசமும் மு.மேத்தா
010)/H	_ ?	

#### அலகு - 2

(இந்திய ஆட்சிப்பணிக்குத் ஆயத்தப்படுத்தும் நோக்கில் அமைந்த பயன்பாட்டுக் கட்டுரை நூல்) ஐஏஎஸ் தேர்வும் அணுகுமுறையும் இறையன்பு இ.ஆ.ப.

#### அலகு 3

#### ஊடகப் படைப்பாக்கம்

தகவல் தொடர்பு அறிமுகம் - உலகப் புகழ்பெற்ற பத்திரிகைகளும் பத்திரிகையாளர்களும் - இதழ்களுக்குச் சிறப்புக் கட்டுரைகள் எழுதுதல் - காணாமல் போன கடித இலக்கிய கட்டுரை – (இந்து தமிழ்) கலை இலக்கியப் பக்கம் -நூற்றாண்டு கடந்த இஸ்லாமியக் கர்னாடக இசை நூல் கீர்த்தனா ரஞ்சிதம் - தமிழ் இதழ்கள் பற்றிய அறிமுகம் - புகழ்பெற்ற இதழ்கள் - புகழ்பெற்ற பத்திரிகையாளர்கள் -தமிழே எங்கள் அடையாளம்

#### அலகு 4

தமிழ் இலக்கிய வரலாறு, ஐம்பெரும் காப்பியங்கள், ஐஞ்சிறு காப்பியங்கள்,

சிற்றிலக்கியங்கள் (உலா, தூது, பிள்ளைத் தமிழ், பரணி)

#### அலகு 5

தமிழ்நாடு அரசுப்பணியாளர் தேர்வாணையத்தின் பொதுத்தமிழ் தாளில் இடம்பெறும் இலக்கணப் பகுதி.

பிழைத்திருத்தம், வல்லினம் மிகும் இடங்கள், மிகா இடங்கள், ஒருமை-பன்மை திருத்தம், மரபுப்பிழைகள், வழுஉச்சொற்கள், பிறமொழிச் சொற்கள், வேர்ச்சொல் உள்ளிட்ட பகுதிகள்.

#### பாடநூல்

பயன்பாட்டுத் தமிழ், சதக்கத்துல்லாஹ் அப்பா கல்லூரித் தமிழ்த்துறை வெளியீடு - 2022

#### பார்வை நூல்கள்

- 1. தமிழ் இலக்கிய வரலாறு, முனைவர் சு.ஆனந்தன், கண்மணி பதிப்பகம், திருச்சி-620002
- இதழியல் நுணுக்கங்கள், செண்பகா பதிப்பகம், 24/28, கிருஷ்ணா பதிப்பகம், சென்னை-600 017.

СО	Upon completion of the course, the students will be able to	PSOs Addres	Cognitive Level
		sed	
CO-1	Associate themselves to regulate life by means of the messages from old Tamils' politics, tradition and to increase belief in God besides knowing about natural resources.	1,2,3,5	Understanding
CO-2	Observe to grow characters related to discipline, high thoughts and to develop a good personality with confidence, further knowing about modern skills to develop creative skills.	1,5,3	Understanding
CO-3	Choose to create media persons, to enhance language skill, to inform historical news, and to know news related to valour and war.	1,2,4	Applying
CO-4	Explain concepts of justice and live with Nature and animals.	4,5,	Analyzing
CO-5	Summarize about arts and the mixing of other languages.	1	Evaluating

#### **Course Outcomes**

Semester	Cour	se Cod	e T	itle of	the Co	urse	Ho	urs	Credits		
III	210	JLTA31		பயன்பாட்டுத் தமிழ்			9	0	3		
Course		Program	nme Le	earning	Programme Specific Outcomes (PSOs)						
Outco		Out	comes	(PLOs)							
mes	PLO 1	1 PLO 2 P	PLO 3	PLO 3 PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
(COs)										Í	
CO-1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	
CO-2	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$		$\checkmark$	
CO-3	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$		$\checkmark$		
CO-4				$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$	
CO-5	$\checkmark$	$\checkmark$				$\checkmark$					
	Numb	Number of matches ( $\checkmark$ ) = 28									
	Relati	Relationship = Medium									

Course Title	MODERN PROSE
Total Hrs.	90
Hrs./Week	6
Course Code	21ULAR31
Course Type	Part – I - Arabic
Credits	3
Marks	100

General Objective: To teach the history of the Prophet Muhammad (PBUH).

CO No	The learners will be able to:
1	Understand the life and history of the Prophet Muhammad (Pbuh).
2	Describe the process of the Prophethood of the Prophet Muhammad (Pbuh).
2	Explain the origins of the first Muslim convert followed by the opposition to the
5	Prophet Muhammad (Pbuh).
4	Illustrate the incidents of Quraish indicted violence.
5	Summarise the migration of the Companions of the Prophet (Pbuh) to Ethiopia.

# Unit I: page No. 27 to 38

# **Unit II: 38 to 49**

# Unit III: 50 to 62

### **Unit IV: 62 to 74**

محاربة قريش لرسول الله على وتفننهم في الإيذاء – ما فعل كفار قريش بأبي بكر؟! – احتيار قريش في وصف رسول الله على – قسوة قريش في إيداء رسول الله على ومبالغتهم في ذلك – إسلام حمزة بن عبد المطلب – ما دار بين عتبة وبين رسول الله علي –

Unit V: 74 to 88

Textbook: Ali Nadawi, Abul Hasan, QasasunNabiyeen Part - V MuassasathusSahafa wa

Nashr publication Lucknow, India, 1999.

#### **Reference Books:**

1. Mohammed Mus'yid Hussain, Qasas Al Anbiya Lil Atfaal, 2010, Dar Al Kunooz, Jordan,

2010.

2. M.R.M. Abdur Raheem, NabimargalVaralaru, Universal Publishers, Chennai, 2015.

#### **Course Outcomes**

CO	Upon completion of the course, the students will	PSOs	<b>Cognitive Level</b>
	be able to:	Addressed	
1	Associate themselves with the art of writing simple	1,2	Understanding
	sentences.		
2	Construct sentences in Arabic using common	1,5	Applying
	words flawlessly.		
3	Interpret the history of the leader of Prophets in	1,2,3,4	Applying
	Islam.		
4	Prioritize to live a life learned from the biography	1,4,5	Analyzing
	of the Prophet Muhammad (PBUH).		
5	Summarize the style of classical prose.	1,2,3	Evaluating

Relationship Matrix											
Semester	Cou	irse Code	e l	Title of the Course			Hours	S	Credits		
III	21	ULAR31	Ν	MODERN PROSE			90		3		
Course	Pro	gramme	Learnin	ning Outcomes			Programme Specific Outcomes				
Outcomes		-	(PLO	s)			-	(PSO	s)		
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO2	PSO3	PSO4	PSO	
	1	2	3	4	5	1				5	
1	✓	√				✓	✓				
2	✓			✓	✓	✓				$\checkmark$	
3	✓	√	√	✓		✓	✓	✓	✓		
4	✓	√		✓	✓	✓			✓	√	
5	✓	√	✓			✓	✓	✓			
				Numl	ber of ma	atches	= 30				
				Rela	tionship	= Medi	um				

Course Title	ONE-ACT PLAYS AND WRITING SKILL
Total Hrs.	90
Hrs./Week	6
Course Code	21ULEN31
Course Type	Part – II - English
Credits	3
Marks	100

# **General Objective:**

To expose students the conversational patterns and help them learn written English in given practical situations.

# **Course Objectives:**

CO	The learners will be able to:
CO-1	Identify and learn the conversational patterns in written communication.
CO-2	Distinguish the patterns of writing in formal and informal situations.
CO-3	Observe the conversational patterns in real-life situations.
CO-4	Examine various possible methods to learn the writing skill through the prescribed texts.
CO-5	Practise writing messages, essays, and reports.

#### UNIT I – ONE-ACT PLAYS

1. The Bishop's Candlesticks	- Norman McKinnell
2. The Proposal	- Anton Chekov
3. The Hour of Truth	- Percival Wilde
UNIT II – ONE-ACT PLAYS	

- 4. Aladdin and his Magic Lamp
   Y. Sayed Mohammed

   5. Time 2. It is a state of the state of the
- 5. Tippu Sultan

- Y. Sayed Mohammed

6. Evergreen Merchant of Venice

### - Y. Sayed Mohammed

### **UNIT III – WRITING SKILL**

- 1. **Messages** (Pages 1-9 of *Written English for You* to be taught and the tasks given to be accomplished in the *Record of Writing*)
- i) What is a message?
- ii) When do we write messages?
- iii) Why do we write messages?
- iv) How do we write messages?
  - 2. Letters 1 (Pages 10-19 *Written English for You* to be taught and the tasks given in pages 17 and 19 should be accomplished in the *Record of Writing*)
- i) Letters for Ordering Supply of Goods
- ii) Letters of Apology
- iii) Letters of Complaint
- iv Letters of Applications
  - 3. **Letters 2** (Pages 36-40 of *Written English for You* to be taught and the tasks given in the pages 38 and 40 should be accomplished in the *Record of Writing*)
- i) Letters to inform your plan of visit
- ii) Letters of Request
- iii) Letters of Apology

#### **UNIT IV – WRITING SKILL**

4. **Essays** (Pages 66-79 to be taught and only the tasks 1-3 from pages 79 and 80 should be accomplished in the *Record of Writing*)

- i) What is an Essay?
- ii) Types of Essays.
- iii) The Structure of an Essay.
- iv) Introductory Paragraph.
- v) Supporting Paragraph.
- vi) What can be the length of an Essay?
- vii) Why am I writing this Essay?
- viii) Who am I writing for?
- ix) How to begin an Essay?
- x) How to organize an Essay?
- xi) What to avoid in writing an Essay?

- 5. **Narrating** (Pages 109-116 of *Written English for You* to be taught only the tasks 1 and 2 from pages 115 to 116 to be accomplished in the *Record of Writing*)
- i) Describing events in a chronological order.
- ii) Narrating events from different points of view
- iii) Narrating events from different view point in time

# UNIT V – WRITING SKILL

- 6. **Reporting** (Pages 127-136 be taught. The tasks given in pages 129-134 and 136-137 must be accomplished in the *Record of Writing*)
- i) News Reports
- ii) Reporting Events or Developments.
- iii) Reporting Interviews and Press Conferences
- iv) Reports of Meetings.
  - 7. **Summarizing** (Pages 164-172 of *Written English for You* be taught and the tasks 1-3 in pages 172-178 to be accomplished in the *Record of Writing*)
- i) What is a Summary?
- ii) How to write a Summary?
- iii) How long should a Summary be?
- iv) Should the Summary be in a Paragraph?
- v) Analysis of the Process of Summarizing.

**NOTE:** Questions for Units III, IV and V should be framed from the tasks given in the prescribed textbook *Written English for You.* 

#### **Textbooks:**

- 1. Compiled by a Board of Editors. *Plays for Pleasure*, Chennai: Paavai Publications, 2009
- 2. Sayed Mohammed.Y, ed. *Three One Act Plays*. Tirunelveli. Mohammed Taahaa Publications, 2011.
- 3. Radhakrishna Pillai. G, ed. *Written English for You* Chennai. Emerald Publishers, 1990 (rpt. 2008)

# **Course Outcomes:**

СО	Upon completion of this course, students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the nuances of English conversational patterns.	1,3,4,6	Understanding
CO-2	Explain the patterns required for conversing in formal and informal situations.	1,3,4,6	Applying
CO-3	Choose to write English sentences by means of applying their skills learned.	1,2,3	Applying
CO-4	Focus on language activities to master the writing skill.	3	Analysing
CO-5	Summarize the uses and methods of writing messages, essays, reports and pamphlets.	1,3,4	Evaluating

Semester	Course Code			1	`itle o	f the (	Course	e	Hou	rs	Credits	
III	III 21ULEN31			ne-A	ne-Act Plays and Writing Skill					)	3	
Course Outcomes	Prog	ogramme Learning Outcomes Program (PLOs)				gramı	nme Specific Outcome: (PSOs)			mes		
(COS)	PLO 1	PLO 2	PLO 3	PLO 4	PLO PLO PLO 4 5 6		PSO 1	PSO 2	PSO PSO 3 4		PSO 5	PSO 6
CO-1	$\checkmark$	$\checkmark$	$\checkmark$				$\checkmark$		$\checkmark$	$\checkmark$		$\checkmark$
CO-2		$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$		$\checkmark$	$\checkmark$		$\checkmark$
CO-3		$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$
CO-4		$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
CO-5		$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$		$\checkmark$	$\checkmark$		$\checkmark$
CO-6												
		Number of matches ( $\checkmark$ ) = 35 Relationship = High										

<b>Course Title</b>	INORGANIC CHEMISTRY – II
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UCCH31
Course Type	DSC-V
Credits	4
Marks	100

#### **General Objective:**

The objective of the course is to enumerate the chemistry of metallurgy and s, p and d block elements

#### **Course Objectives**:

CO No.	The learners will be able to :
CO-1	Know the various processes involved in extraction of metals from its ore.
CO-2	Observe the general and anomalous properties of alkali and alkaline earth metals
CO-3	Illustrate general characteristics, preparation, properties, uses and structure of p-block elements
CO-4	Explore the general characteristics, extraction of d-block elements
CO-5	Outline the preparation and uses of some important compounds of alkai and alkaline earth metals

# Unit I - Metallurgy

Difference between minerals and ore - Concentration – gravity separation- froth flotation - magnetic separation – chemical separationcalcination and roasting -Kroll's process - monds process. Thermodynamics of reduction processes-Ellinghem diagram. Extraction of metal-chemical reduction-electrolytic reduction-metal displacement. Refining methods distillation - fractional crystallization - electrolytic refining - van Arkeldeboer method - vapour phase refining, ion exchange method.

# Unit II - s-block elements

General characteristics - anomalous behaviour of lithium and beryllium - diagonal relationships of lithium with magnesium and beryllium with aluminium. Extraction of Li from lipidolite and Be from beryl.

Preparation, properties and uses of lithium hydride, sodium peroxide, potassium iodide, BeO, BeCl<sub>2</sub>, calcium carbide, CaCl<sub>2</sub>, super phosphate of lime, Plaster of Paris and lithopone- biological importance sodium and potassium.

# Unit III - p-block elements

General characteristics - extraction of Boron - Preparation, properties, structure and uses of boric acid, borate, boron nitrides, diborane, carboranes, silanes, oxides of nitrogen, phosphorous and halogens.

Inter halogen compounds and pseudo halogens.

#### Unit IV - d-block elements – I

General characteristics with respect to electronic configuration, colour, variable valency, magnetic and catalytic properties and ability to form complexes – Stability of various oxidation states and EMF (diagram). Difference between I, II and III transition series.

Extraction of Titanium from ilmenite, Vanadium from vanadinate, Platinum from sperrylite - polyvalency of Vanadium and chromium.

### Unit V - d-block elements – II

Comparative study of Ti, Zr and Hf – V, Nb and Ta – Cr, Mo and W – Fe, Co and Ni – Zn, Cd and Hg – Cu, Ag and Au.

Preparation and uses of Titanium Oxide, Titanium tetra chloride, Vanadium pentoxide, Ammonium meta vanadate, Ammonium Molybdate, Sodium Cobalti Nitrite and Potassium Chloro palatinate – Toxicity of Cd and Hg.

# **REFERENCE BOOKS :**

- 1. Cottan, F.A. Advanced Inorganic Chemistry. Wiley. 6thEdu.1996
- 2. Huhee, J. Inorganic Chemistry, pearson publication, 2012.
- 3. Lee, J.D. New Concise Inorganic Chemistry. ELBS 5th Ed.2002.
- 4. Madan, R.L., et.al. *Inorganic Chemistry.* S. Chand Co., Ltd. New Delhi. 2003
- 5. Malik, U. Et.al. Selected Topics in Inorganic Chemistry. S.Chand.
- 6. Puri, B.R. et.al. *Principles of Inorganic Chemistry*. Milestone publishers, New Delhi, 2007.
- 7. Sathya Prakash, G.D. et.al. *Advanced Inorganic Chemistry*, Vol. I & II, S. Chand and Company Pvt. Ltd., New Delhi, 2013.

CO No.	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Outline the different process in metallurgy	1,3,5	Understanding
CO-2	Discuss the general characteristics of s-block elements and the preparation, properties and uses of their compounds.	1,3,5	Understanding
CO-3	Illustrate the preparation, uses and importance of transition elements	1,3,5	Applying
CO-4	Explain the preparation, properties and uses of diborane, borazinecarboranes, silanes,	1,3,5	Analyzing
CO-5	Summarize the various processes involved in extraction of metals from its ore.	1,3,5	Evaluating

#### **COURSE OUTCOMES**

Semester	Con	urse ode	Title of the C			ourse		Hours	Cre	Credits	
III	21UC	CH31	INOR	GANIC	CHEM	ISTRY	– II	60		4	
Course	]	Progran	nme Lo	earning	g	]	Progra	amme S	Specifi	С	
Outcomes		Outco	omes (l	PLOs)			Oute	comes (	PSOs)		
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	✓				✓	✓		✓		✓	
CO-2	✓				✓	✓		✓		✓	
CO-3	✓	✓	✓		✓	✓		✓		✓	
CO-4	✓	✓	✓		✓	✓		✓		✓	
CO-5	✓	✓	✓		✓	✓		✓		✓	
	Number of matches (✓) = <b>31</b> Relationship = Medium										

# **RELATIONSHIP MATRIX**

Course Title	INORGANIC QUANTITATIVE ANALYSIS AN PREPARATION OF INORGANIC COMPLEXES	١D
Total Hrs.	30	
Hrs./Week	2	
<b>Course Code</b>	21UCCH3P1	
Course Type	Practical-III	
Credits	1	
Marks	100/2	

#### **General Objectives:**

To estimate the *concentration* of compounds present in a solution by titration and prepare inorganic complexes

#### **Course Objectives:**

CO	The learners will be able to :							
CO-1	Observe a complexometric titration.							
CO-2	Investigate the complexing agent required for the volumetric							
	estimation							
CO-3	Analyze quantitatively the hardness for a given sample of water							
CO_4	Examine the quantity of Zinc, Chlorine, Antimony, Aluminium by							
00-4	volumetric estimation.							
	Estimate some metal ions quantitatively present in samples used							
0-5	in daily life.							

#### **Volumetric Estimation:**

#### I Complexometric titrations:

- 1. Estimation of Zinc.
- 2. Estimation of Calcium
- 3. Estimation of Total hardness of water
- 4. Estimation of Aluminium

#### II. Iodometry:

- 1. Estimation of Antimony
- 2. Estimation of free Chlorine in bleaching powder.
- 3. Estimation of Phenol.

# **Inorganic Complex Preparation**

- 1. Preparation of Potash alum
- 2. Preparation of Chrome alum
- 3. Preparation of Prussian blue
- 4. Preparation of Tetramminecopper(II) sulphate
- 5. Preparation of Tetraamminecarbonatocobalt(II)nitrate
- 6. Preparation of Potassium Tris OxalatoFerrate(III)trihydrate.

#### Course work

- 1. Estimation of Zinc in Zinc sulphate tablets
- 2. Estimation of Iron in dates.

3. Estimation of Copper in a brass sample

### **REFERENCE BOOKS :**

- 1. Ahluwalia, V. K., Dhingra, S., Gulati, A., *College Practical Chemistry*, Universities Press, 2005, ISBN: 9788173715068.
- 2. Bajpai, D. N., Pandey O. P. and Giri, S., *Practical Chemistry*, S Chand & Co Ltd, 2013, ISBN: 9788121908122.
- 3. Jeffery G. H., Bassett J., Mendham J., Denneya. R C., Vogel's Text book of Quantitative Chemical Analysis, Fifth Edition, Longman Scientific and Technical, UK, 1989
- 4. Mukhopadhyay, R., Chatterjee, P., Arunabha Sen R., *Advanced Practical Chemistry*, Books & Allied(P) Ltd., Kolkata, 2007.
- 5. Nad, A.K., Mahapatra, B., Ghoshal, A., *Advanced Course in Practical Chemistry*, New Central Book Agency (P) Ltd., Kolkata, 2000.
- 6. Vishnoi, N. K., *Advanced Practical Chemistry*, Vikas Publishing House, New Delhi, 2005.

CO	Upon completion of the course, the	PSOs	Cognitive
	students will be able to :	Addressed	Level
CO-1	Classify the complexing agent required for the volumetric estimation.	1,2,4	Understanding
CO-2	Demonstrate the quantitative estimation based on complex formation.	1,2,4	Applying
CO-3	Calculate the number of moles required to prepare inorganic complexes.	1,2,5	Applying
CO-4	Analyze quantitatively the hardness for a given sample of water.	1,2,3,4,5,	Analyzing
CO-5	Estimate the quantity of metal ions in solutions by suitable volumetric estimation.	1,2,3,4	Evaluating

### **Course Outcomes**

Semester	Co Co	urse ode	ר	itle of	the C	ourse		Hours	Cre	edits
III	21UC	CH3P1	Inorg	Inorganic Quantitative			tive	30		1
			Anal	Analysis and Preparation			ion			
			of In	organi	c Com	plexe	s			
Course	Programme Learning Programme Specific							С		
Outcomes		Outco	mes (l	PLOs)			Outo	omes (	PSOs)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓	<ul> <li>✓</li> </ul>	√	✓	✓	✓	✓		✓	
CO-2	✓	✓	$\checkmark$	✓		✓	✓		✓	
CO-3	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO-4	✓	✓	√	✓		<ul> <li>✓</li> </ul>	✓	✓	✓	✓
CO-5	✓	✓	✓	✓		✓	✓	✓	✓	
	Number of matches ( $\checkmark$ ) = 41 Relationship = $\checkmark$									

#### SEMESTER- III

Course Title	ALLIED PHYSICS-I
Total Hrs.	60
Hrs./Week	4
Course Code	21UAPH31
Course Type	Allied-II/1
Credits	4
Marks	100

#### General Objective:

To understand the basics of properties of matter , Optics , Thermal physics and laws of thermodynamics.

#### **Course Objectives:**

СО	The learners will be able to:
CO-1	Define the basic concepts of elasticity
CO-2	Illustrate the important features of interference and diffraction.
CO-3	Study the motion of viscous fluids by applying Poiseuille's formula.
CO-4	Analyze the fundamental modes of heat transfer and its applications.
CO-5	Appraise the laws of thermodynamics and illustrate the working of heat engines such as Carnot engine.

#### UNIT I Elasticity

Elastic modulii – Poisson's ratio – relation between elastic constants – Expression for bending moment – cantilever – expression for depression – experiment to find young's modulus (uniform bending) – expression for elevation – experiment to find young's modulus using microscope (non uniform bending) – expression for depression – experiment to find Young's modulus using scale and telescope-Applications of Elastic property.

#### UNIT II Interference and Diffraction

Young's experiment – Condition for interference – Maxima and minima – Air wedge – Thickness of wire – Newtons ring –Determination of wavelength using newton's rings -Diffraction – Plane transmission grating – Theory and experiment to find wave length by normal incidence method- Difference between interference and diffraction bands.

#### UNIT III Viscosity

Viscosity – Viscous force – Co-efficient of viscosity – units and dimensions – Poiseuille's formula for co-efficient of viscosity of a liquid – determination of coefficient of viscosity using burette and comparison of Viscosities - Bernoulli's theorem – Statement and proof- Applications of viscous forces.

#### **UNIT IV: Conduction, Convection and Radiation**

Specific heat capacity of solids and liquids-Newton's law of cooling – Specific heat capacity of a liquid by cooling – thermal conduction – Applications of conduction

process- Davey's safety lamp- coefficient of thermal conductivity by Lee's disc method- Convention process-Radiation -Black body radiation – Planck's radiation law – Stefan's law of radiation. (No derivations).

### **UNIT V: Thermodynamics**

Zeroth and I Law of thermodynamics – II law of thermodynamics – Carnot's engine and Carnot's cycle – Efficiency of a Carnot's engine – Entropy – Change in entropy in reversible and irreversible process – change in entropy of a perfect gas – change in entropy when ice is converted into steam- Applications (Domestic refrigerator)

### **Books for Study and Reference:**

- 1. Properties of matter Brijlal & Subrahmanyam S.Chand & Co. New Delhi.
- 2. College Physics Volume 1 A.B.Gupta Books and Allied (P) Ltd. Kolkatta 700010.
- 3. Heat and Thermodynamics, Brijlal & Subramaniyam S.Chand & Co. New Delhi.
- 4. A Text book of Optics, Brijlal, Subrahmanyam & M.N.Avathanu S.Chand & Co. – New Delhi.

СО	Upon completion of the course, the	PSOs	<b>Cognitive Level</b>
	students will be able to:	Addressed	
CO-1	Recall the basic concepts of elasticity	1,2	Remembering
CO-2	Discuss the important features of interference and diffraction with experiments associated with it.	3,4	Understanding
CO-3	Illustrate the motion of viscous fluids by using Poiseuille's method	2,4	Applying
CO-4	Test the fundamental modes of heat transfer and its applications.	3,4	Analyzing
CO-5	Summarise the applications of laws of thermodynamics	2,4	Evaluating

#### **Course Outcomes**

Semester	Course Code			Course Code Title of the Course			se	Hour	S	Credits	
III	21UAE	PH31		Allied H	hysics-	I	60 4				
Course Outcomes	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)					
(COs)	PLO	PLO 2	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO	
	1		3	4	5	1	2	3	4	5	
CO-1	✓	$\checkmark$	$\checkmark$	✓	$\checkmark$	$\checkmark$	<ul><li>✓</li></ul>				
CO-2	✓	$\checkmark$	$\checkmark$	✓				✓	✓		
CO-3	✓	$\checkmark$	$\checkmark$				✓		√		
CO-4	✓	$\checkmark$	$\checkmark$		$\checkmark$			✓	√		
CO-5	$\checkmark$	$\checkmark$	$\checkmark$				$\checkmark$		$\checkmark$		
		Number of matches ( $\checkmark$ ) = 29									
				Rela	tionship	= Med	ium				

#### SEMESTER- III

Course Title	ALLIED PHYSICS PRACTICAL-I
Total Hrs.	30
Hrs./Week	2
Course Code	21UAPH3P1
Course Type	Allied Practical-II/1P
Credits	1
Marks	100/2

#### **General Objective:**

To understand the basics of properties of matter, Optics, Polarization and Thermal physics by doing related experiments

#### **Course Objectives:**

СО	The learners will be able to:
CO-1	Understand the concept of Youngs modulus of the given material
CO-2	Determine the thickness of a wire by applying the basic principle of optics .
CO-3	Understand the way to calibrate voltmeter using potentiometer
CO-4	Understand and analyze the characteristics of Zenor diode
CO-5	Understand the function of logic gates

- 1. Young's modulus Uniform bending (Pin and Microscope)
- 2. Young's modulus Non Uniform bending (scale and Telescope)
- 3. Verification of Kirchoff's law.
- 4. Verification of Newton's law of cooling
- 5. Spectrometer Grating Oblique incidence
- 6. LCR series circuit
- 7. Air wedge Thickness of wire
- 8. Calibration of Voltmeter using potentiometer
- 9. Characteristics of Zener diode
- 10. Basic logic gates OR, NOT & AND

#### **Books for Reference:**

- 1. Practical Physics Ouseph, Srinivasan & Vijayendran,
- 2. Practical Physics P. R. Sasi Kumar, PHI.
- 3. Advanced Practical Physics S. P. Singh, Pragathi Prakasam.
- 4. Practical Physics St. Joseph College, Trichy.

# **Course Outcomes**

СО	Upon completion of the course, the	PSOs	Cognitive Level
	students will be able to:	Addressed	
CO-1	Calculate the Youngs modulus of the given material	2,3,4,5	Applying
CO-2	Calculate the thickness of thin wire using Airwedge and wave length of the spectral line using spectrometer	2,3,4,5	Applying
CO-3	Construct the circuit to calibrate voltmeter using potentiometer	2,3,4,5	Analyzing
CO-4	Analyze the characteristics of Zenor diode	2,3,4,5	Analyzing
CO-5	Construct basic logic gates usinf NAND ans NOR gates	2,3,4,5	Creating

Semester	Cou	rse Code		Title of the Course				Hours	Cr	edits
III	210	APH3P1		ALLIED PHY				2		1
				PRA	ACTICA	LS-I				
Course	Pro	gramme 1	Learnin	g Outco	mes	Prog	gramm	e Specifi	c Outco	omes
Outcomes			(PLOS)					(PSOS)		
(COs)	PLO	PLO 2	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO
	1		3	4	5	1	2	3	4	5
CO-1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	~	✓	$\checkmark$
CO-2	√	$\checkmark$	$\checkmark$	$\checkmark$	✓		$\checkmark$	√	✓	✓
CO-3	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	✓	$\checkmark$
CO-4	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
CO-5	<ul> <li>✓</li> </ul>	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	√	✓	$\checkmark$
		Number of matches ( $\checkmark$ ) = 40								
		Relationship = High								

Course Title	FUNDAMENTALS OF COMPUTING AND SECURITY
Total Hrs.	30
Hrs./Week	2
Course Code	21USFC31
Course Type	SEC-I
Credits	2
Marks	100

#### **General Objectives:**

Introduce the fundamentals of computing devices and particularly with respect to personal use of computer hardware and software, the Internet, Cyber Crime and Cyber Security.

#### **UNIT I Fundamental of Computers**

The Role of Computers in Modern Society - Block Diagram of Digital Computer - Working Principle of Computer - Hardware-Software- Types of Software - Operating system-Definition-Single user and multi-user operating system-Time sharing-multitasking-multiprogramming-Batch Processing-on-line processing-spooling.

#### **UNIT II Microsoft Office Package**

Basics of Office Automation Tools - Microsoft Word: Create Documents – Edit and Format Documents - Microsoft Excel: Create Worksheet – Edit and Filter - Microsoft PowerPoint: Create Presentation – Edit and format Presentation – Microsoft Access: Create Database and Table – Designing database.

#### **UNIT III Networks**

Components of a Communication System - Types of Networks : Local Area Network - Metropolitan Area Network - Wide Area Network -Wireless and Wired Network - Network Topologies - World Wide Web (WWW) - Client - Server Computing.

#### **UNIT -IV Cyber Security for ICT**

Information and Communication Technology: Introduction-Basics of ICT-Ethical & Social Issues in ICT -Digital Citizenship-Elements of Digital Citizenship- Need for Cyber Security

#### UNIT -V Cyber Crime & Cyber Security

Cyber Crime: Introduction--Types of Cyber Crime-Security Issues: Threats-Attacks-Vulnerabilities - Cyber Space-Security Services - Cyber Security: Definition, Key Concepts, Fundamentals, Cyber Challenges and Ethics.

### **Textbooks:**

 Cyber Crime & Cyber Security – "Unit IV and V , Dr. S. Shajun Nisha,PG and Research Department of Computer Science ".

### **Reference Books:**

- 1. Fundamentals of Computers, by V.Rajaraman, PHI, Fifth Edition, April 2010.
- 2. Microsoft Office Complete Reference BPB Publication
- "Introduction to Data communication and networking" Behrouz Forouzan- Tata McGraw Hill 2<sup>nd</sup> Edition, 2006.

#### **SEMESTER- III**

Course Title	SWAYAM-NPTEL Online Certification Course
Total Hrs.	30
Hrs./Week	2
Course Code	21USOC32
Course Type	SEC-II
Credits	2
Marks	100

# SWAYAM NPTEL ONLINE CERTIFICATION COURSES GUIDELINES AND INSTRUCTIONS

- National Programme on Technology Enhanced Learning (NPTEL) provides elearning through online web and video courses in Engineering, Science and Humanities streams through its portal https://swayam.gov.in/ncdetails/NPTEL.
- 2. Enrollment to all the courses is FREE.
- 3. Enrollment to courses and Examination Registration can be done ONLINE only. The link is available on NPTEL Website <u>http://nptel.ac.in/</u>
- 4. SWAYAM NPTEL Online Certification Courses are made optional for the students in the UG Programmes from the Academic year 2021-2022.
- 5. Any Eight Week, Two-Credit Course in any discipline be chosen by the respective Departments in the Third Semester of the Undergraduate Programmes.
- The SWAYAM-NPTEL Online Certification Courses offered during the December – April Semester be chosen by the Departments. The courses may be handled by the Department Mentor or by any teacher in the respective Departments.
- 7. Candidates must have completed Examination Registration and submitted assignments successfully within the prescribed time to receive hall tickets and to write examinations.
- 8. The allocation of marks for the online examination conducted by the respective IITs is 25:75 for each course.
- A candidate should obtain a minimum of 40 marks on 100 marks (a minimum of 10 marks for Assignment and 30 marks in the final examination) to pass the Online Courses.

- If a student fails in the Online Examination conducted by the respective IITs he/she would be permitted to write a Supplementary Examination for 75 marks by the Controller of Examinations of our College.
- 11. Those who registered for the Online Courses, obtained Assignment marks, appeared for the Online Examination and failed in the courses alone are eligible to apply for the Supplementary Examinations conducted by the College.
- 12. If a candidate fails in the Supplemenary Examinations or does not appear for the Supplemenary Examinations conducted by the College, the norms followed for taking an Arrear Examination will be adopted.
- 13. Course Completion Certificate will not be issued by the respective IITs for the candidates who clear the Online Courses through the Supplementary Examinations conducted by the College. The two credits the candidate earns, if passed in the Supplemenary Examinations would be added in the Consolidated Statement of Marks issued by the Controller of Examinations.

<b>Course Title</b>	CHEMICAL KINETICS AND POLARIMETRY
Total Hrs.	30
Hrs./Week	2
Course Code	21USCH31
<b>Course Type</b>	SEC -III
Credits	2
Marks	100

# General Objectives:

The objective of the course is to acquaint the students about the composition of different theories and applications of chemical kineticsand Polarimetric method.

### Course Objectives:

СО	The learner will be able to :			
CO-1	Infer the basic theories of chemical kinetics			
$CO^{2}$	Infer the basics ofpolarimetry, and its instrumentation			
0-2	technique			
CO-3	Illustrate the principle and instrumentation of polarimetry			
CO-4	Perceive knowledge of the applications of polarimetry			
CO-5	Analyse the stereo chemical aspects of molecules			

# **UNIT I: Chemical Kinetics**

Chemical kinetics – reaction rate, rate laws, unit for rate constant,– order and molecularity of a reaction –First order reaction —kinetics,Half-life period – Second order reaction-kinetics of same and different initial concentration-Pseudo First order reaction and Zero order reaction- examples

# **Unit II: Introduction to Polarimetry**

Plane polarized and Unpolarized light, means of production of polarized light - Optical activity-specific rotation- Factors affecting angles of rotationcauses for optical rotation- polarimeter- principle, instrumentation and calibration- industrial applications.

# **Unit III: Qualitative Polarimetry**

Optical activity versus Path Length and Concentration- Determination of rate of hydrolysis of Sucrose catalyzed by acid- Qualitative estimation of Carbohydrates and Amino Acids - Inversion of sucrose

# **Unit IV: Quantitative Polarimetry**

Quantitative Polarimetry- Determination of the specific rotation of sucrose -Percentage of d-sugar and d-tartaric acid in a mixed solution- Food Analysis- Determination of Starch Content, dry matter in cereal productsOptical Purity - of a racemic mixture. (S)-bromobutane and (R)-bromobutane.

# **UNIT V: Theory Of Kinetics**

Theory of reaction rate – Effect of temperature on reaction rate - Arrhenius Equation – Collision Theory - Lindeman's theory of unimolecular reactions – Absolute reaction rate theory (ARRT) – Comparison of ARRT with collision theory- Limitations.

# **REFERENCE BOOKS :**

1.Chemical Kinetics, Keith J Laidler, Third Edition, 2008, ISBN 978-81-317-0972-6

2. Experiments in Physical Chemistry, Carl W. Garland, Joseph W. Nibler, DavidP. Shoemaker, McGraw-Hill Higher Education, Eighth Edition, 2009, ISBN 978-0-07-282842-9

3. College Practical Chemistry, V.K. Ahluwalia, SunitaDhingra, AdarshGulati, University Press (India) Private Limited, 2012, ISBN: 978 81 7371 5060 8.

4. A Text Book of Practical Organic Chemistry, A. I. Vogel, Fifth edition, Longman, Pearson Education India, 1989.

5. University Practical Chemistry, P.C. Kamboj, Vishal Publishing Co., Punjab, 2010.

6. Dean's Analytical Chemistry Handbook, PradyotPatnaik, McGraw-Hill Handbooks, 2<sup>nd</sup> Edition, ISBN-13: 978-00714106012004

CO	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO1	Understand the basic concepts of Chemical kinetics	1,3,4,5	Understanding
CO2	Understand the theory of Polarimetry	1,2,4,5	Understanding
CO3	Construct the instrumentation of polarimetry	1,3,4,5	Applying
CO4	Categorize the chemical molecules	1,2,4	Analyzing
	based on stereochemical features		
CO5	Determine the arrangement of functional groups in organic molecules	1,3,4,5	Evaluating

**Course Outcomes** 

Semester	Course Code			Title of the Course			Hours		Credit					
III	210	21USCH31		CHEMICAL KINETICS AN POLARIMETR		CHEMICAL KINETICS AN POLARIMETE		CHEMICAL KINETICS AN POLARIMETI		D XY	30		2	
Course	I	Program	nme L	earning	g	] ]	Progra	mme S	Specifi	С				
Outcomes		Outco	omes (	PLOs)			Outc	omes (	PSOs)					
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO				
	1	2	3	4	5	1	2	3	4	5				
CO-1	✓			✓	✓	√	~	~	~	✓				
CO-2	~	$\checkmark$	<b>√</b>	$\checkmark$	~		$\checkmark$		~					
CO-3		$\checkmark$	<b>√</b>	~	~	~		~	$\checkmark$	~				
CO-4	~			✓	~		~		$\checkmark$	~				
CO-5				✓	✓	✓	✓	$\checkmark$	<b>√</b>	✓				
		Number of matches ( $\checkmark$ ) = 36												
		Relationship = High												

<b>Course Title</b>	APPLIED CHEMISTRY – I
Total Hrs.	30
Hrs./Week	2
<b>Course Code</b>	21UNCH31
<b>Course Type</b>	NME-I
Credits	2
Marks	100

### General Objectives:

This course describes various industrial processes involved in manufacturing petrochemicals, fertilizers, glass, cement and paint as well as their uses.

### Course Objectives:

CO	The learners will be able to :					
CO-1	Describe the components of petroleum refining and its products					
CO-2	Elaborate the role of fertilizers in the growth of plants					
CO-3	Identify the raw materials required for glass manufacture					
CO-4	Figure out the composition of different forms of cement					
CO-5	Explain the classification and requirements for a good paint					

#### UNIT I - PETROCHEMICALS

Petroleum- Refining - Fractional distillation- cracking (Thermal and catalytic cracking)- Octane rating- Cetane rating - Flash point-Petrochemicals- Direct and Indirect- LPG, CNG, LNG, Biofuels- Advantages of Bioethanol and biodiesel - Power Alcohol

#### UNIT II - FERTILIZERS AND MANURES

Fertilizers-Classification, macro nutrients - Role of N, K and P on plant growth- Manufacture of urea, muriate of potash, and triple super phosphate - Complex fertilizers, mixed fertilizers and bio fertilizers and their composition.

Micro nutrients -Their role in plants.

Organic manures- Composition, process - handling and storage.

#### **UNIT III - GLASS INDUSTRY**

Glass- Composition-Physical and Chemical properties - Manufacture of glass- Uses of: Fused Silica glass, High Silica glass, Borosilicate glass -Pyrex glass, Photochromic glass, Fiberglass, Glass laminates and Safety glasses.

#### UNIT IV - CEMENT INDUSTRY

Manufacture of Cement – Composition of slag, Super sulphate, Coloured - Blended – Portland – cement - Properties, Testing and Uses of: Gypsum, Plaster of Paris.

### **UNIT V - PAINT INDUSTRY**

Paints - Classification - Constituents - Setting of Paint- Requirements of a Good Paint, uses of: Emulsion Paint, Latex Paint, Luminescent Paint, Fire Retardant Paint, Heat Resistant Paint – Paint Removers-Varnishes types and uses.

#### **REFERENCE BOOKS :**

- 1. Acharya A., Samantaray B., *Textbook on Applied Chemistry*, Pearson India, 2016, ISBN:9789332587632.
- 2. Arora M.G., M. Singh, *Industrial Chemistry*, Anmol Publisher, 2002, ISBN-13: 978-8170419310.
- 3. Ghosh J., *Fundamental Concepts of Applied Chemistry*, S. Chand and Company, New Delhi, 2019, ISBN -10 9788121926549.
- 4. Jain and Jain, *Engineering Chemistry*,16<sup>th</sup>Edition Dhanpat Rai Publishing Company, 2015, ISBN-10: 9352160002.
- 5. Sharma B.K., Industrial Chemistry, Goel Publishing House, Meerut, 2003.
- 6. Shreve R.N., *Chemical Process Industries*, Tata McGraw Hill Publishing Company, Mumbai, 2000.

СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Discuss the petroleum refining process and raw materials required for the manufacturing of cement, glass and paints.	1,3,5	Understanding
CO-2	Describe the composition of fertilizers, cement, glass, paints and manures.	1,3,5	Understanding
CO-3	Classify the petrochemicals, micronutrients and paints	1,3,5	Applying
CO-4	Establish the importance of bioethanol, biodiesel, nitrogen, potassium, phosphorus, different types of glasses and paints	1,3,5	Analyzing
CO-5	Determine the appropriate raw materials required for the manufacture of the respective industrial products	1,3,5	Evaluating

#### **Course Outcomes**
Semester	Cour	se Cod	e	Title	•	Hours	cr	edits		
III	21UN	CH31	Α	APPLIED CHEMISTRY - I 30 2						
Course	] ]	Prograi	nme L	earning	g	]	Progra	mme S	pecific	;
Outcomes		Outc	omes (	PLOs)			Outo	omes (I	PSOs)	
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO
	1	2	3	4	5	1	2	3	4	5
CO-1	✓	✓	✓		✓	✓		✓		✓
CO-2	<ul> <li>✓</li> </ul>	✓	✓		<ul> <li>✓</li> </ul>	✓		<ul> <li>✓</li> </ul>		<ul> <li>✓</li> </ul>
CO-3	✓		✓		✓	✓		<ul> <li>✓</li> </ul>		<ul> <li>✓</li> </ul>
CO-4	✓		$\checkmark$		✓	✓		✓		✓
CO-5	$\begin{tabular}{ c c c c c c } \hline $V$ & $$									
	Number of matches (✓) = 32 Relationship = <del>Low</del> /Medium/ <del>High</del>									

Course Title	சங்கத்தமிழ் (Sangam Tamil)
Total Hrs.	90
Hrs./Week	6
Course Code	21ULTA41
Course Type	Part – I - Tamil
Credits	3
Marks	100

# **Course Objectives:**

CO	The learners will be able to:						
CO-1	Distinguish Sangam Tamil from other literature and language.						
CO-2	Give examples about love, valour and charity in Tamil tradition.						
CO-3	Determine to follow life protocols through literature.						
CO-4	Focus on improving their self confidence.						
CO-5	Choose to instruct about modern skills like computer.						
அலகு –	1 சங்கச் செய்யுள்கள்						
1. நற்றின	ணை - நின்ற சொல்லர், நீடு தோன்று இனியர் (1:1-9)						
	அம்ம வாழி தோழி நன்னுதற்கு (388:1-10)						
2. குறுந்ெ	தாகை - ஆம்பற்பூவின் சாம்பலன்ன (46: 1-7)						
	- வேரல் வேலி வேர் கோட்பலவின் (18:1-5)						
3. புறநால	றாறு - ஈன்று புறந்தருதல் எந்தலைக் கடனே (312: 1-6)						
	நின் நயந்து உறைநா்க்கும் நீநயத்து உரை நற்கும் (163: 1-9)						
4. ஐங்குழ	<u> 3</u> நூறு - களவன் பத்து – முள்ளிவேர்						
	அளைக் களவன் ஆட்டி (23: 1-4)						
	புலவிப் பத்து – அம்சில் ஓதி அசிநடைப் பாண்மகள் (49: 1-4)						
5. கலித்	தாகை - வநியவன் இளமைபோல், வாடிய சினையவாய்ச் (10:1-23)						
6. அகநா	னூறு - நாம் நகையுடையம் நெஞ்சே! – கருந்தேறல் (121:1-15)						
7. பதிற்ற	ப்பத்து - இழையர் குழையர் நறுந்தண்மாலையர் (46:1-14)						
8. பரிபாட	ல் - வைகையில் பெரு வெள்ளம்-நிறை கடல் முகந்து உராய் (1-24)						
9. முல்ன	லப்பாட்டு - முழுவதும்						
<b>அ</b> லகு –	2						
	சுயமுன்னேற்றக் கட்டுரைகள்						
<u> அ</u> லகு –	3						
	இணையப் பயன்பாட்டில் தமிழ்						
<u> அ</u> லகு –	4						
	இலக்கிய வரலாறு — சங்க இலக்கியம் ஓர் அறிமுகம் - திணைக்கோட்பாடு						
- 6	ாட்டுத்தொகை நூல்கள் - நற்றிணை, குறுந்தொகை, ஐங்குறுநூறு,						
பதிற்ற	ப்பத்து, பரிபாடல், கலித்தொகை, அகநானூறு, புறநானூறு – பத்துப்பாட்டு						
ட்ட் த நூல்க	ள் - திருமுருகாற்றுப்படை, பொருநராற்றுப்படை, சிறுபாணாற்றுப்படை,						

பெரும்பாணாற்றுப்படை, நெடுநல்வாடை, குறிஞ்சிப்பாட்டு, முல்லைப்பாட்டு, மதுரைக்காஞ்சி, பட்டினப்பாலை, மலைப்படுகடாம்

அலகு – 5

தமிழர் வாழ்வில் அகமும் புறமும் திணைக்கோட்பாடு

**பாடநூல்:** சங்கத் தமிழ், சதக்கத்துல்லாஹ் அப்பா கல்லூரி தமிழ்த்துறை வெளியீடு. **பார்வைநூல்** : தமிழ் இலக்கிய வரலாறு, சாகித்ய அகாதெமி வெளியீடு.

СО	Upon completion of the course, the students will be able to:	PSOs Address ed	Cognitive Level
CO-1	Associate themselves to learn about disciplines related to internal and external lives besides knowing about the growth of Tamil by the establishment of Sangam.	1,4,5	Understanding
CO-2	Develop their knowledge about the regulated life, charity, administration and habits of Sangam Tamils.	1,4,5	Applying
CO-3	Classify kings and lords in line with the historical information.	1,2,3,4	Analyzing
CO-4	Differenitate the honest life, high thoughts, barter system and modern skills of the courtesans.	4, 5	Analyzing
CO-5	Summarize about water, air and land resources.	5	Evaluating

#### **Course Outcomes**

Semester	Cour	Course Code		fitle of	the Co	ourse	Hou	rs	Cred	its	
IV	21U	LTA41		சங்கத்தமிழ்			90	)	3		
Course	Progra	umme I	earnir/	rning Outcomes P			Program	rogramme Specific			
Outcomes			(PLO:	s)			Outo	comes	(PSOs)	)	
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO	
	1	2	3	4	5	1	2	3	4	5	
CO-1	~	<b>√</b>	<b>√</b>	<b>√</b>	<b>√</b>	$\checkmark$			<b>√</b>	<b>√</b>	
CO-2	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	
CO-3	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$	~	
CO-4	$\checkmark$	$\checkmark$		$\checkmark$					$\checkmark$	$\checkmark$	
CO-5	$\checkmark$				$\checkmark$					$\checkmark$	
	Numbe Relatio	Number of matches $(\checkmark) = 32$ Relationship = High									

Course Title	CLASSICAL PROSE
Total Hrs.	90
Hrs./Week	6
Course Code	21ULAR41
Course Type	Part –I - Arabic
Credits	3
Marks	100

**General Objective:** To impart moral values to students and build their personality to make them better citizens.

Course	Obj	ectives:

CO	The learners will be able to:
1	Observe the etiquettes to be followed with the Prophet (PBUH) discussed in Surah
	Al-Hujuraath.
2	Associate themselves with the good characters in day today life.
3	Illustrate the life histories of Imams of the Quran, Hadeeth and Islamic
	Jurisprudence.
4	Examine the style of Classical Arabic i.e. the language of the Quran and Hadeeth.
5	Explain the moral values mentioned in Hadeeth.

#### Unit I: Verses from 1 to 12 from (Sura – al – Hujraat)

" من الآية "يا أيها الذين آمنوا لا تقدموا" إلى الآية"يا أيها الذين آمنوا اجتنبوا

Unit II: Verses from 10 to 18 from (Sura-al-Hujraat) & verses from Surah Luqman (12 to 19)

**Unit III:** Collection and compilation of Quran and Hadeeth, History of Ibn Abbas (Ral), Imam Ibn-Khathir, History of Imam Abu Hanifa, Ash-shafi, History of Imam Bukhari, Muslim, Abu Dawood, At-Tirmidi, An-Nasaee and Ibn-Majah

Unit IV: Hadeeth 1 to 10

#### Unit V:- Hadeeth 11 to 20

"من الحديث " لا تمنعوا نسائكم "- إلى الحديث "حق المسلم على المسلم خمس

# **TEXT BOOK**

- 1. A study material on "Tafseer Surah Al Hujuraath and from Suraah Luqman and Biographies of selected Islamic Scholars" prepared by Dr. J. Ubaiyathulla and Dr. S.A. Mohamed Rafeek.
- 2. Shaykh Dr. V. Abdur-Raheem, Ahadeeth Sahlah, Islaamic Foundation Trust, 1994

### **Course Outcomes**

CO	Upon completion of the course, the students will	PSOs	<b>Cognitive Level</b>
	be able to	Addressed	_
1	Understand the core essence of the Qur'anic	1,2	Understanding
	verses.		
2	Develop refined manners based on the clear	1,2,4	Applying
	understanding of the values as preached in the		
	Holy Qur'an.		
3	Analyze the life history of the eminent scholars	1,2,3	Analyzing
	and their remarkable contributions to the Quran		
	and Hadeeth literature.		
4	Evaluate the immaculate virtues and inspiring	1,2,3,4	Evaluating
	value systems of the Prophet.		
5	Select a healthy environment to practise abiding	1,2,3,5	Evaluating
	by the teachings of the Prophet (PBUH).		

Semester	Cou	rse Cod	e	Title of the Course			Hours		Credits		
IV	210	ULAR41	(	CLASSIC	CAL PR	OSE	90		3		
Course	Prog	gramme	Learni	ng Outco	omes	Pro	Programme Specific Outcomes				
Outcom			(PLC	)s)				(PSC	)s)		
es (COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO	
	1	2	3	4	5	1	2	3	4	5	
1	✓	$\checkmark$				✓	· ✓				
2	✓	$\checkmark$		✓		√	<ul> <li>✓</li> </ul>		<ul> <li>✓</li> </ul>		
3	✓	$\checkmark$	<ul> <li>✓</li> </ul>			√	√	✓			
4	✓	$\checkmark$	✓	✓		√	✓	✓	<ul> <li>✓</li> </ul>		
5	<ul> <li>✓</li> </ul>	√	✓	✓	<ul> <li>✓</li> </ul>	√	✓	✓		✓	
	Numbe	Number of matches = 33									
	Relatio	nship = N	Mediun	1							

Course Title	A PRACTICAL COURSE IN SPOKEN ENGLISH
Total Hrs.	90
Hrs./Week	6
Course Code	21ULEN41
Course Type	Part – II - English
Credits	3
Marks	100

### **General Objective:**

To introduce students to the interactive expressions and pronunciation practice to help themselves become competent in spoken mode of communication.

#### **Course Objectives:**

СО	The learners will be able to:							
CO-1	sociate themselves with the interactional and transactional modes of language.							
CO-2	assify words based on the register and usage to use them contextually.							
CO-3	stinguish sound patterns in English phonetically.							
CO-4	ustrate sound patterns in English with relevant examples.							
CO-5	actise to master competency in description, narration, argumentation and continuous speech.							

# UNIT I

Interactive Expressions and Pronunciation Practice: Consonants (Chapters 1 - 3 of *A Course in Spoken English*)

# UNIT II

Introducing oneself / others, patterns for greeting, requesting, expressing and responding to thanks and etc., & Pronunciation Practice: Vowels (Chapters 4 – 8 of *A Course in Spoken English*)

### UNIT III

Developing descriptive competency, narrative competency, arguing competency, compering competency and Pronunciation Practice: Diphthongs (Chapters 9 – 13 of *A Course in Spoken English*)

#### UNIT IV

Practising continuous speech, group discussion and pronunciation practice: Word Accent and Intonation (Chapters 14 – 19 of A Course in Spoken English)

# UNIT V

Listening Practice : Students will listen to audio and video materials for 10 - 12 hours.

### Textbooks, Workbook, Record Note:

- 1. Nihamathullah. A. et al. *A Course in Spoken English*, Tirunelveli: MSU, 2005. (rpt. 2010).
- 2. Board of Editors, Department of English, Sadakathullah Appa College, A Workbook for A Course in Spoken English, 2011.
- 3. Spoken English Practical Record.

### **Evaluation Scheme:**



#### **Distribution of Marks**

External Marks	:	60 Marks
Workbook	:	05 Marks
Record Note	:	05 Marks
External Oral Test	:	50 Marks
Internal Marks	:	40 Marks
Listening Test	:	05 Marks
Loud Reading	:	05 Marks
The best two of the three CIA test marks	:	30 Marks

# **Course Outcomes**

со	Upon completion of this course, students will be able to:	PSOs Addressed	ognitive Level
CO-1	Understand and describe the nuances of language used in general communication.	1,2,4	Understanding
CO-2	Give examples of words with different register suiting the context.	1,2	Understanding
CO-3	Apply their knowledge of Phonetics and vocabulary to learn to speak distinctly.	1,2,3	Applying
CO-4	Prioritize learning vocabulary and pronounce them phonetically so as to help themselves attain the flow of speech.	1,2,3	Analysing
CO-5	Find errors in the usage and pronunciation of English words committed by their peers.	1,2,3,4	Evaluating

Semester	Course Code			Title of	the C	ourse	F	lours	Cre	edits
IV	211	JLEN41	<b>P</b> I	RACTICA SPOKE	AL COU EN ENG	RSE IN LISH	1	90		
Course		Program	nme I	earning	ç		Progra	mme S	Specifi	C
Outcomes		Out	come	s (PLOs)			Out	tcomes	; (PSOs	)
(COs)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	$\checkmark$	$\checkmark$		✓		$\checkmark$	$\checkmark$		$\checkmark$	
CO-2	~	✓				$\checkmark$	$\checkmark$			
CO-3	$\checkmark$	✓	$\checkmark$			$\checkmark$	$\checkmark$	<ul> <li>✓</li> </ul>		
CO-4	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$		
CO-5	$\checkmark$	$\checkmark$	$\checkmark$				$\checkmark$	$\checkmark$		$\checkmark$
	Number of matches ( $\checkmark$ ) = 30									
		Relationship = Medium								

<b>Course Title</b>	ORGANIC CHEMISTRY – II
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UCCH41
<b>Course Type</b>	DSC-VI
Credits	4
Marks	100

#### General Objectives:

This course elaborates the organic name reactions, organic reagents, organic reaction mechanisms and polynuclear hydrocarbon synthesis.

#### **Course Objectives**:

CO	The learners will be able to :
CO-1	Differentiate the reactions on the basis of mechanism.
CO 2	Distinguish the type of reactions in organic chemistry including
0-2	substitution, addition and elimination.
CO-3	Predict the leaving group in organic reactions
CO 4	Identify the types of substitution reactions on aromatic
CO-4	compounds.
CO F	Synthesize and analyze the product formed based on the
00-5	functional group present in the compound.

#### **UNIT I - Organic Name Reactions**

Mechanism and applications of the following reactions: Baeyer Villiger oxidation, Cannizzaro reaction, MPV reduction, Wolf - Kishner reduction, Clemenson reduction, Wittig reaction, Oppenaeur oxidation, Diels - Alder reaction, Gattermann reaction, Perkin's reaction, Claisen's reaction and Knovenagel reaction.

#### **UNIT II - Reagents of synthetic importance**

Preparation and synthetic applications of Aluminium isopropoxide, Diazomethane, Lithium Aluminium Hydride, Lead Tetra acetate, Sodium borohydride, N-Bromosuccinimide, Selenium dioxide, Per-iodic acid, Osmium tetroxide, Grignard reagent, Methyl lithium and Diethyl zinc.

### UNIT III - Reaction mechanism

Substitution reactions -  $S_N{}^1$  and  $S_N{}^2$  mechanism - effect of substrate - structure, nucleophile, leaving group and the solvent on nucleophilic substitution reactions. Differences between  $S_N{}^1$  and  $S_N{}^2$  reaction - Neighboring group participation due to n,  $\pi$  and  $\sigma$  electrons.  $S_N{}^{1'}$ ,  $S_N{}^{2'}$ ,  $S_N{}^{i}$ ,  $S_N{}^{i'}$  mechanisms.

Addition reaction - Markovnikov's rule and Anti-Markovnikov's rule - stereochemistry of cis and trans addition.

Elimination reactions -  $\alpha$  and  $\beta$  eliminations -  $E_1$  and  $E_2$  mechanisms - effect of substrate structure, base, solvent and the leaving group on elimination. - Hoffmann, Saytzeff and Bredt's Rule.

#### **UNIT IV - Aromatic Substitution reaction**

Mechanism of electrophilic aromatic mono - substitution (nitration, halogenation, sulphonation, Friedel Crafts alkylation, acylation) - Aromatic disubstitution - Korner's absolute method of orientation - Orientation effects of - OH, - NH<sub>2</sub>, - X, - CH<sub>3</sub>, - NO<sub>2</sub> and -SO<sub>3</sub>H on electrophilic substitution based on resonance concept - Rules of aromatic tri substitution.

Nucleophilic aromatic substitution - Unimolecular, bimolecular and benzyne mechanism with examples - Homolytic aromatic substitution (side chain halogenations of alkyl benzenes)

### UNIT V - Polynuclear hydrocarbons

Isolated systems - preparation of diphenyl, triphenylmethane and stilbene- Atropisomerism - Optical activity of diphenyl derivatives -Condensed system - synthesis, reactions and structural elucidation of naphthalene, anthracene and phenanthrene - Preparation and properties of naphthyl amine, naphthols, naphthoquinones and Alizarin.

### **REFERENCE BOOKS:**

- 1. Carey, F. A., Sundberg, R. J., *Advanced Organic Chemistry*, Part A: Structure and Mechanisms, Springer Science, New York, USA, 2007, e-ISBN-13: 978-0-387-44899-3.
- 2. Carey, F. A., Sundberg, *Advanced Organic Chemistry, Part B: Reactions and Synthesis*, Springer Science, New York, USA, 2007, e-ISBN-13: 978-0-387-44899-3.
- 3. Carruthers W. and Coldham I., *Modern Methods of Organic Synthesis*, 4<sup>th</sup> Edition, Cambridge University Press, 2004.
- 4. Desai K.R., Organic Name Reactions, Oxford Book Company, 2008, ISBN: 978-81-89473-29-7.
- 5. Finar I. L., Organic Chemistry Vol. I and II, (Sixth ed,); Addison Wesley Longman Ltd., England, 1996.
- Jack Li J., Name Reactions A Collection of Detailed Reaction Mechanisms, 3rd. expanded ed, Springer Berlin Heidelberg New York, ISBN-10 3-540-30030-9
- Kürti L. and Czakó B., Strategic Applications of Named Reactions in Organic Synthesis, Elsevier Academic Press, 2005, ISBN: 0-12-429785-4.
- 8. Morrison R. T. and Boyd R. N., *Organic Chemistry*, 4th edition, New York, Allyn and Bacon Ltd, 1976.
- 9. Wade, Jr. L. G., Organic Chemistry, Eighth Edition, Pearson Education, Inc. USA, ISBN 978-0-321-76841-4 (0-321-76841-8).

# **Course Outcomes**

CO	Upon completion of the course, the	PSOs	Cognitive
	students will be able to :	Addressed	Level
CO-1	Interpret the plausible mechanism for	1,3,5	Understanding
	different organic name reactions,		
	reactions involving substitution in		
	aromatic compounds and Hoffmann,		
	Saytzeff and Berdt's Rule.		
CO-2	Describe the preparation, a wide	1,3,5	Understanding
	range of applications of reagents in		
	organic reactions and the synthesis of		
	polynuclear hydrocarbons.		
CO-3	Examine the different types of leaving	1,3,5	Applying
	group in reactions, addition reaction,		
	elimination reaction and whether the		
	aromatic substitution reaction is		
	nucleophilic or electrophilic		
CO-4	Differentiate the various name	1,3,5	Analyzing
	reactions, addition, elimination		
	reaction products, aromatic		
	substitution reactions and		
	polynuclear hydrocarbons		
CO-5	Summarize role of nucleophile,	1,3,5	Evaluating
	electrophile, solvent, leaving group,		
	orientation effects and optical activity		
	in organic compounds		

Semester	Cour	se Code	•	Title of the Course Hours C						edits
IV	21U	CCH41	OR	GANIC	CHEM	IISTR	Y-II	60		4
Course	]	Program	nme L	earnin	g	]	Progra	amme S	Specifi	с
Outcomes		Outco	mes (	PLOs)			Outo	comes (	PSOs)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓	✓	✓			✓		✓		✓
CO-2	✓	✓	<ul> <li>✓</li> </ul>	$\checkmark$	✓	$\checkmark$		✓		<ul> <li>✓</li> </ul>
CO-3	✓	✓				$\checkmark$		✓		$\checkmark$
CO-4	✓					✓		✓		<ul> <li>✓</li> </ul>
CO-5	✓	✓	<ul> <li>✓</li> </ul>		✓	✓		<ul> <li>✓</li> </ul>		<ul> <li>✓</li> </ul>
		Number of matches ( $\checkmark$ ) =30								
			Rela	tionshi	p = Lo	w/Med	lium/	High		

Course Title	INDUSTRIAL CHEMICAL ANALYSIS
Total Hrs.	30
Hrs./Week	2
Course Code	21UCCH4P1
Course Type	Practical-IV
Credits	1
Marks	100/2

### **General Objectives:**

This course focuses on working with various instruments used for analysis in chemical industries

### **Course Objectives**:

CO	The learners will be able to :
CO-1	Estimate pH and turbidity
CO-2	Prepare buffer solutions
CO-3	Determine ions by flame photometry
CO-4	Examine the specific rotation
CO-5	Determine electrical conductance

- 1. Determination of pH of
- (a) aerated drinks, (b) fruit juices, (c) soaps and (d) shampoos
- 2. Preparation of buffer solutions:
- (a) Sodium acetate-acetic acid
- (b) Ammonium chloride-ammonium hydroxide
- (c) Citric acid ammonium citrate
- 3. Determination of Na<sup>+</sup> and K<sup>+</sup> using Flame Photometry
- 4. Verification of Beer Lambert's law by colorimetric method
  (a) CuSO<sub>4</sub> (b) K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
- 5. Determination of specific rotation by polarimetry.
  - (a) D(+)-Glucose (b) L(-)-tartaric acid
- 6. Determination of electrical conductance by conductivity meter.(a) H<sub>2</sub>O(b) Soil
- 7. Determination of turbidity by turbidity meter.
  - (a) Water (b) Milk

# **Course Work**

- 1. Estimation of nitrogen by Kjeldahl's method
- 2. Manufacture of soap
- 3. Manufacture of detergent

# **RERERENCE BOOKS:**

- 1. Patel H.N. College Practical Chemistry: Himalaya Publishing House: India, 2010.
- 2. Vogel A.I., Jeffery G.H. *Vogel's textbook of Quantitative Chemical Analysis*, 5<sup>th</sup> edition: Longman Scientific and Technical: New York, 1989.

	Course Outcom	es			
СО	Upon completion of the course,	PSOs	Cognitive		
	the students will be able to :	Addressed	Level		
CO-1	Use various equipments involved	1,2,5	Applying		
	in chemical industries.				
CO-2	Analyze the pH of the aerated	1,2,3,5	Analyzing		
	drinks and juice				
CO-3	Measure the conductivity and	1,2,3,5	Evaluating		
	turbidity of the solution				
CO-4	Predict the optical activity of	1,2,3,5	Evaluating		
	organic compounds				
CO-5	Prepare soap and detergent	1,3,4,5	Creating		

Semester	Co	urse ode	1	<b>Fitle o</b>	Hour	S	Credits					
IV	21UC	CH4P1	IND	USTR	IAL CH	IEMIC	AL	30		1		
			AN	IALYSI	S PRA	CTICA	AL					
Course	I	Program	nme Le	earnin	g	J	Progra	mme S	nme Specific			
Outcomes		Outco	omes (]	PLOs)	-		Outc	omes	<b>PSO</b>	s)		
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSC	) PSO		
•••	1	2	3	4	5	1	2	3	4	5		
CO-1	✓	✓			✓	✓	✓			✓		
CO-2	✓	✓	<ul> <li>✓</li> </ul>		✓	✓	✓	✓		✓		
CO-3	<ul> <li>✓</li> </ul>	✓	✓		✓	✓	✓	✓		✓		
CO-4	✓	✓	✓		✓	<ul> <li>✓</li> </ul>	✓	✓		✓		
CO-5	✓		<ul> <li>✓</li> </ul>	✓	✓	$\checkmark \qquad \checkmark \qquad$						
		Number of matches ( $\checkmark$ ) = 38 (High)										
		Relationship = High										

Course Title	ALLIED PHYSICS II
Total Hrs.	60
Hrs./Week	4
Course Code	21UAPH41
Course Type	Allied-II/2
Credits	4
Marks	100

#### **General Objective:**

To give an insight to the electricity, electromagnetism, electronics, atomic and nuclear physics

#### **Course Objectives:**

СО	The learners will be able to:
CO-1	Define Ohm's law and Kirchoff's law.
CO-2	Illustrate the LCR series and parallelcircuits.
CO-3	Explain the Nuclear structure, concept of Binding energy and Nuclear forces.
CO-4	Analyze the working of semiconductor diode, zener diode, transistor and their characteristics.
CO-5	Assess the working of Half adder and full adder

#### UNIT ICURRENT ELECTRICITY:

Ohm's law – Law of resistance in series and parallel – Specific resistance – capacitors – capacitors in serial and parallel – Kirchoff's laws – Wheatstone's network – condition for balance – Potentiometer – calibration of Voltmeter.

#### UNIT II ELECTROMAGNETISM:

Electromagnetic Induction – Faraday's laws – Lenz law – Self Inductance – Mutual Inductance – Coefficient of Coupling A.C. Circuits – Mean value – RMS value – Peak value – LCR in series circuit –- impedance – resonant frequency – sharpness of resonance- LCR in Parallel circuit.

### UNIT III ATOMIC AND NUCLEAR PHYSICS

Bohr's atom model – radius energy – Atomic excitation – Ionization potential – Nucleus – Nuclear properties – Mass defect – Binding energy. Radio isotopes – Uses of radio isotopes – Nuclear fusion and Nuclear fission – X-rays – Production – properties –Derivation of Bragg's law – uses in industrial and medical fields

**UNIT IV ANALOG ELECTRONICS:** Semiconductor – PN junction diode – Bridge rectifier – Zener diode – Regulated power supply. Transistor – Working of a transistor – CE Configuration – current gain relationship between a and  $\beta$  – Transistor Characteristics – CE Configuration only. Applications of transistor as switch, amplifier, vibrator.

### UNIT V DIGITAL ELECTRONICS

Number system – Decimal – Binary – Octal and Hexadecimal system –conversion of one number system to another number system. Logic gates – OR, AND, NOT, XOR, NAND and NOR gates – truth tables – Half adder and Full adder – Laws and theorems of Boolean's algebra – De Morgan's theorems.

#### **Books for study and References:**

1. Modern Physics – R. Muruges<br/>an and Kiruthiga Sivaprasath - (15 $^{\rm th}$  edition) – S.<br/>Chand & Co., New Delhi.

2.Electricity and Magnetism - R.Murugesan - (8th edition) – S.Chand & Co., New Delhi.

3.Introduction to Integrated Electronics, Digital and Analog - V.Vijayendran, S.Viswanathan Pvt Ltd., Chennai.

СО	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	State Ohm's law and Kirchoff's law.	1,2	Remembering
CO-2	Discuss LCR series and parallel circuits and their applications.	1,3	Understanding
CO-3	Interpret the stability of Nucleus.	1,4	Applying
CO-4	Explain the working of semiconductor diode, zener diode, transistor and their characteristics.	1,4,5	Analyzing
CO-5	Test the working of Half adder and full adder.	1,3,5	Evaluating

#### **Course Outcomes**

Semester	Course CodeTitle of the Coll21UAPH41ALLIED PHYS			Course	•	Hours	5 (	Credits		
IV				ALLIED PHYSICS II			I	60		4
Course Outcomes	Programme Learning Outcomes (PLOs)					Programme Specific Outcom (PSOs)				tcomes
(COs)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	~	$\checkmark$	$\checkmark$	~	~	$\checkmark$	$\checkmark$			
CO-2		$\checkmark$	<ul> <li>✓</li> </ul>	<ul> <li>✓</li> </ul>	✓	$\checkmark$		✓		
CO-3	$\checkmark$	$\checkmark$		<ul> <li>✓</li> </ul>	<ul> <li>✓</li> </ul>	$\checkmark$			✓	
CO-4	$\checkmark$	$\checkmark$	✓	✓	✓	$\checkmark$			<ul> <li>✓</li> </ul>	√
CO-5		✓	✓	✓	$\checkmark$	$\checkmark$		✓		√
	Number of matches ( $\checkmark$ ) = 40 Relationship = High									

Course Title	ALLIED PHYSICS PRACTICALS-II
Total Hrs.	30
Hrs./Week	2
Course Code	21UAPH4P1
Course Type	Allied Practical-II/2P
Credits	1
Marks	100/2

#### **General Objective:**

To understand the basics of properties of matter, optics, electricity and thermal physics by doing experiments

#### **Course Objectives:**

СО	The learners will be able to:
CO-1	Determine the Viscosity of a liquid by capillary flow method
CO-2	Determine the wavelength of Spectral colours using spectrometer Grating by Normal incidence method
CO-3	Determine the Thermal conductivity of a bad conductor using Lee's disc.
CO-4	Construct a circuit to Calibrate a low range ammeter using Potentiometer
CO-5	Design AND, OR, NOT and XOR gates using NAND and NOR gates and verify their truth tables

- 1. Young's modulus Cantilever depression
- 2. Lee's disc Thermal Conductivity
- 3. Transistor Characteristics (CE mode)
- 4. Viscosity- capillary flow
- 5. Spectrometer Grating Normal incidence
- 6. Newton's rings Refractive Index of lens
- 7. LCR parallel circuit
- 8. AND, OR, NOT, NAND, NOR and EX-OR gates -Verification of Truth table
- 9. Half adder & Full adder Verification of Truth table
- 10. Calibration of low range Ammeter- Potentiometer

#### **Books for Reference:**

1. Practical Physics - Ouseph, Srinivasan & Vijayendran,

- 2. Practical Physics P. R. Sasi Kumar, PHI.
- 3. Advanced Practical Physics S. P. Singh, Pragathi Prakasam.
- 4. Practical Physics St. Joseph College, Trichy.

# **Course Outcomes**

СО	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Calculate the Viscosity of a liquid by capillary flow method	3,4,5	Applying
CO-2	Calculate the wavelength of Spectral colours using spectrometer Grating by Normal incidence method	3,4,5	Applying
CO-3	Calculate the Thermal conductivity of a bad conductor using Lee's disc.	3,4,5	Analyzing
CO-4	Construct a circuit to Calibrate a low range ammeter using Potentiometer	3,4,5	Creating
CO-5	Construct AND, OR, NOT and XOR gates using NAND and NOR gates and verify their truth tables	3,4,5	Creating

Semester	Course Code Title of the Course					Course Code		Hou	rs Ci	redits
IV	210/	APH4P1		ALLIED PHYSICS			30		1	
Course Outcomes	Prog	ramme	Learnir (PLOs)	arning Outcomes Programme			ramme	Specifi (PSOs)	ic Outo	comes
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO
	1	2	3	4	5	1	2	3	4	5
CO-1	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$
CO-2	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$
CO-3	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$
CO-4	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$
CO-5	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$
	Number of matches (✓) = 40 Relationship = High									

Course Title	SOFT SKILLS
Total Hrs.	30
Hrs./Week	2
Course Code	21USSS41
Course Type	SEC-III
Credits	2
Marks	100

#### Unit – I - Introduction to Soft skills:

Soft skills – Meaning and definition – Importance of soft skills – Soft Skills Vs Hard Skills – Components of Soft skills – Life skills, Communication Skills, Employability Skills and Corporate Skills – Ways to develop soft skills – Applications of Soft skills.

#### Unit – II - Life Skills:

Life Skills – Meaning and Significance – Elements of Life skills – **Attitude** – Types of Attitude – Developing positive attitude – **Self development** – self awareness – benefits – Motivation – Types – Intrinsic and Extrinsic -Self Assessment through SWOT – **Emotional Intelligence** – Need of E.I -Goleman's EQ model – Methods of EI Development.

#### **Unit - III - Communication skills**

Communication skills - Types of communication - Barriers of communication - Overcoming barriers of communication – **Listening Skills** – Process of listening – Types of listening – Barriers to effective listening – Effective listening Strategies - **Reading Skills** – Essential of Reading - Methods of Reading – **Speaking Skills** - benefits of speaking -Self development through speaking skills - **Writing skills** - purpose -Importance of styles in writing skills - **Non verbal Communication** – Importance – Types.

### Unit – IV - Employability Skills:

Internet Skills – Job web portals – Roles and Significance of Job portals – Registration process in Job Portals – **Resume Building** – Resume Content – Resume designs and Layouts – Job Application letter – Format and writing Tips of Application Letter – **Interview Skills** – Types of Job Interview – Interview preparation techniques – Group Discussion – Roles to play in Group discussion.

# Unit – V - Corporate Skills:

Leadership skills - Manager Vs Leader - Mintzberg's Managerial roles -Traits of Good leader - **Time Management** - Major Blocks to Time Management - Covey's Time Management Matrix - Time Management tips - **Negotiation Skills** - Approaches of Negotiation - **Avoid**, **Compete, Accommodate, Compromise and Collaborate - Stages of Negotiation - Stress Management - Causes and Consequences of stress - Stress Coping Strategies.** 

#### **REFERENCE BOOKS:**

- 1. Suresh, K. E. (2010). Communication Skills and Soft Skills: An Integrated Approach (With Cd). Pearson Education India.
- S. Hariharan, S. Sundararajan and SP. Shanmughapriya, Soft skills, MJP publishers, Chennai, 2010.

Course Title	INDUSTRIAL CHEMICAL PROCESSES
Total Hrs.	30
Hrs./Week	2
Course Code	21USCH42
Course Type	SEC-IV
Credits	2
Marks	100

#### General Objective:

The course focuses on topics related to industrial chemistry such as Petroleum, Explosive, Cement and Fertilizers.

#### **Course Objectives:**

CO	The learners will be able to :					
$CO_{-1}$	Understand the techniques involved in hydrocarbon cracking					
00-1	process					
CO-2	Relate the suitable lubricants for metallic structures					
CO-3	Determine the basic composition of fireworks					
CO-4	Investigate the manufacturing process of cement					
CO-5	Specify the suitable fertilizers for plant growth					

#### **UNIT I- Petroleum Industry**

Refining of Petroleum - Composition and uses of main petroleum fractions - Cracking, Thermal and Catalytic cracking - Advantages of Catalytic cracking - Octane rating - Antiknock agents - Unleaded petrol -Cetane rating - Diesel knock agents - Flash point - Synthetic petrol - Fischer Tropsch process - Blended petrol

### UNIT II - Lubricants

Needs of Lubricants, Mechanism - Thick film - Thin film - Extreme pressure lubrication. Classification of lubricants - lubricating oils, semisolid, solid lubricants, synthetic lubricants. Properties of lubricants - viscosity index, cloud point, pour point

# **UNIT III -Pyrotechnics and Explosives**

Match Industry - Safety measures - composition of match head - composition of Fireworks - Colored matches

Explosives - Classifications - Primary Explosives - Preparation of Lead Azide– DDNP. High Explosives - Preparation of TNT and GTN

### UNIT IV- Cement

Composition, Properties of cement - Adhesion, Cohesion, Curing rate, Hygroscopicity, Deformability. Manufacture of cement - Dry and Wet process. Types and composition of Slag, Sulphate resistant cement, Coloured, Blended Portland cement, Plaster of Paris, Gypsum

### **UNIT V- Fertilizers and Biofertilizers**

Plant nutrients – Classification – Macronutrients – Role of N,P,K in plant growth - Micronutrients and their role in plant growth - Need for fertilizers. Manufacture of Urea, Triple super phosphate and Muriate of Potash. Complex Fertilizers, Mixed Fertilizers and Biofertilizers – composition. Organic manure - Farmyard, oil cake, blood meal, Fish manure

# **REFERENCE BOOKS :**

- 1. Sharma B.K., Industrial Chemistry, Goel Publishers: Meerut, 2013.
- 2. Ghosh, K.N. The Principles of Firecrackers, Economic Enterprises: Sivakasi, 1981.
- 3. WieslawKurdowskiCement and Concrete Chemistry, Springer: New York, 2014
- 4. Dara S. S., Umare S.S.*Text book of Engineering Chemistry*, S. Chand:New Delhi, 2004
- 5. Basak, R.K.*Fertlizers- A Text Book*, 4<sup>th</sup> Edition; Kalyani Publishers: New Delhi, 1999
- 6. Kannaiyan S, Kumar K, Govindarajan K. *Biofertilizers Technology*. Scientific Publishers: New Delhi, 2004.

CO	Upon completion of the course,	PSOs	Cognitive Level
	the students will be able to :	Addressed	
CO-1	Distinguish octane number and	1,2,4,5	Understanding
	Cetane rating of fuel		
CO-2	Determinethe properties of	1,2,4,5	Applying
	lubricants such as viscosity		
	index, cloud and pour point		
CO-3	Distinguish the basic	1,2,4,5	Analyzing
	composition of fireworks		
CO-4	Classify the various	1,2,4,5	Analysing
	compositions of cement		_
CO-5	Select the appropriate fertilizers	1,2,	Evaluating
	for plant growth		_

# **Course Outcomes**

Semester	Cours	se Code	<b>T</b>	Title of the Course			H	Hours		Credits	
IV	21U	SCH42	In	dustria	al Che	mical		30		2	
				Pro	cesses	;					
Course	J	Program	nme Lo	earning	g	] ]	Progra	ogramme Specific			
Outcomes		Outco	mes (l	PLOs)			Outc	omes (	PSOs)		
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	✓	✓		✓		✓	✓		✓	✓	
CO-2	✓	✓		✓		✓	✓		✓	✓	
CO-3	✓	✓		✓		✓	✓		✓	✓	
CO-4	✓	✓		✓		✓	✓		✓	✓	
CO-5	✓	✓		✓		✓	✓		~	✓	
	Number of matches ( $\checkmark$ ) =35										
	Relationship = High										

<b>Course Title</b>	APPLIED CHEMISTRY-II
Total Hrs.	30
Hrs./Week	2
<b>Course Code</b>	21UNCH41
Course Type	NME-II
Credits	2
Marks	100

### **General Objectives:**

This course explains about soaps, detergents, lubricants, therapeutic uses of drugs, nuclear reactions and their applications and the classification of explosives

### **Course Objectives:**

CO	The learners will be able to :					
CO-1	Define soap and detergent.					
CO-2	Identify the chemicals used as lubricants.					
CO-3	Predict the therapeutic usage of various drugs.					
CO-4	Outline the working principle for atomic and hydrogen bombs.					
CO-5	Assess the types of nuclear reactions and types of reactors.					

### **UNIT I - SOAPS AND DETERGENTS**

Soaps- Classification – Manufacture of Soaps [Hot and Cold processes] - manufacture of toilet soap, liquid soap and shampoos - cleansing action of soap.

Detergents - types: Cationic, Anionic Amphoteric and Non-ionic detergents - importance of surfactants- definition- advantages of detergents over soaps.

# UNIT II – LUBRICANTS

Lubricants - functions.

Classification: Liquid lubricants, Semi-Solid lubricants, Solid Lubricants. Properties and uses of:

Lubricating oils: Animal and vegetable oils, mineral oils, blended oils. Synthetic lubricating oil: polyalkene glycols.

Semi Solid lubricants: Greases.

Solid Lubricants- Graphite.

Selection of Lubricants.

# **UNIT III - PHARMACEUTICAL CHEMISTRY**

Structure and therapeutic uses of the following important drugs (an elementary study only)

Antiseptics: Alum, Boric acid, Hydrogen peroxide Antacids: Aluminium hydroxide Analgesics: Aspirin, Paracetamol

Hematinic: Ferrous fumarate, ferrous gluconate

Laxatives: Epsom salt, Milk of magnesia

Sedatives: Diazepam.

# **UNIT IV - NUCLEAR CHEMISTRY**

Nuclear fission - energy released during fission - Uncontrolled fission -Principle of Atom bomb - Controlled fission - Atomic reactors - Thermal reactors and Fast Breeder reactors.

Nuclear fusion - Principle of Hydrogen bomb - Stellar energy - Differences between nuclear fission and nuclear fusion.

Applications of radioactive isotopes - in medicine and agriculture.

# UNIT V - EXPLOSIVES

Explosives- Classification - High explosives and Low Explosivespreparation of TNT, Picric acid, dynamite, Lead azide – Role of mustard gas and phosgene.

# **REFERENCE BOOKS :**

- 1. Acharya A., Samantaray B., *Textbook on Applied Chemistry*, Pearson India, 2016, ISBN:9789332587632.
- 2. Arora M.G., M. Singh, *Industrial Chemistry*, Anmol Publisher, 2002, ISBN-13: 978-8170419310.
- 3. Ghosh J., *Fundamental Concepts of Applied Chemistry*, S. Chand and Company, New Delhi, 2019, ISBN -10 9788121926549.
- 4. Jain and Jain, *Engineering Chemistry*,16<sup>th</sup>Edition Dhanpat Rai Publishing Company, 2015, ISBN-10: 9352160002.
- 5. Sharma B.K., Industrial Chemistry, Goel Publishing House, Meerut, 2003.
- 6. Shreve R.N., *Chemical Process Industries*, Tata McGraw Hill Publishing Company, Mumbai, 2000.

СО	Upon completion of the course,	PSOs	Cognitive
	the students will be able to :	Addressed	Level
CO-1	Describe soap, detergent,		Understanding
	lubricant, nuclear reactions and	1,3,5	
	explosives		
CO-2	Classify the types of soaps,	1,3,5	Understanding
	detergents, lubricants, drugs and		
	explosives		
CO-3	Illustrate the examples for	1,3,5	Applying
	lubricants, drugs and explosives		
CO-4	Outline the uses of various	1,3,5	Analyzing
	lubricants, drugs and explosives		
CO-5	Compare the types of nuclear	1,3,5	Evaluating
	reactions, nuclear reactors and the		
	applications of radioactive		
	compounds.		

# **Course Outcomes**

<b>a</b> .	~	~	- 100							-	
Semester	Course Code			Title of the Course					ırs	C1	redits
IV	210	JNCH4	1	APPLI	ED CH	IEMISTRY-II 30					2
Course	I	Program	nme I	earnin	g		Progra	mme \$	Spec	cifi	с
Outcomes		Outco	omes	(PLOs)			Outc	omes	(PSC	Ds)	
(COs)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSC	<b>)</b> 4	PSO 5
CO-1	✓	✓	✓		✓	<ul> <li>✓</li> </ul>		✓			✓
CO-2	✓	✓	✓		✓	✓		✓			✓
CO-3	✓		✓		✓	✓		✓			✓
CO-4	✓		✓		✓	✓		✓			✓
CO-5	✓		✓		✓	✓		✓			✓
			]	Number	of mat	tches	$(\checkmark) = 32$	2			
	Relationship = Low/Medium/High										
							-				

**Relationship Matrix** 

Course Title	FIELDWORK / INTERNSHIP
Course Code	21UFCH41
Course Type	FW/I
Credits	2
Marks	100

The following guidelines have been framed for the courses titled Fieldwork and Internship for all the U.G. Programmes.

- Fieldwork/Internship shall be in the fourth semester of each programme.
- A Department can opt for either Fieldwork or Internship.
- Fieldwork may be done individually or in groups not exceeding five per group.
- The minimum length of the Fieldwork report should be 15 to 20 pages in A4 size.
- Marks for the Fieldwork Report will be 100 divided as 60% for the Fieldwork and 40% for Viva-Voce Examination. 2 Credits will be awarded to the students who complete Internships and produce Internship Completion Certificate duly signed by the authority concerned.
- Fieldwork / Internship shall be allotted outside the working hours for a maximum of six days.

Scheme of Evaluation:		
Fieldwork	Internal	External
Word of title / Topic	5	5
Objectives / Formulation including Hypothesis	5	5
Methodology / Techniques / Procedures adopted	15	15
Chapterization of the Fieldwork Report	15	15
Summary / Findings / Summation	5	5
Works Cited / Work Consulted / References / Annexures / Footnotes	10	10
Relevance of the Fieldwork to social needs	5	5
	60	60

# Scheme of Evaluation:

Course Title	PHYSICAL CHEMISTRY-II
Total Hrs.	75
Hrs./Week	5
<b>Course Code</b>	21UCCH51
Course Type	DSC-VII
Credits	4
Marks	100

# **General Objective:**

The course focuses on the concepts of thermodynamics with detailed approach, phase rule and solution phase.

#### **Course Objectives:**

СО	The learners will be able to :				
CO-1	Distinguish the thermodynamic properties with respect to adiabatic changes				
CO-2	Relate the I and II law of thermodynamics				
CO-3	Explore the concept of chemical potential and the III law of thermodynamics				
CO-4	Outline the various laws pertaining to solution				
CO-5	Determine the concept of Phase rule with one and two component systems				

#### UNIT I – THERMODYNAMICS-I

Relation among P - V, T - V and P - T during adiabatic changes -Expression for w, q,  $\Delta E$ ,  $\Delta H$ , for 'n' moles of an ideal gas and real gas obeying van der Waals gas during reversible and irreversible, isothermal and adiabatic processes - comparison of work done during reversible and irreversible process & isothermal and adiabatic expansion of an ideal gas -Joule - Thomson effect - Joule Thomson (JT) coefficient - Derivation of expression for Joule - Thomson coefficient for an ideal gas and a real gas obeying van der Waals gas - Inversion temperature - calculation and its significance.

### UNIT II - THERMODYNAMICS – II

Limitations of the first law of thermodynamics - Spontaneous process - Carnot cycle - different statement of second law of thermodynamics of equation of state

Concept of entropy - dependence of entropy on Pressure, Temperature and Volume, Termaperature of the system. Entropy changes of reversible, isothermal and adiabatic process of an ideal gas - Entropy changes during phase transitions - Entropy of mixing of ideal gas - physical significance of entropy

Free energy - Helmholtz free energy (A) and Gibbs free energy (G) - variation of free energy with T and P - Gibbs - Helmholtz equation and its

significance. - Clapeyron equation - applications - Clausius - Clapeyron equation and applications

# UNIT III - THERMODYNAMICS III

Partial molar properties - chemical potential - Gibbs - Duhem equation - derivation and significance - variation of chemical potential with temperature and pressure - chemical potential in a system of ideal gases -Concept of fugacity - physical significance of fugacity - activity - activity Coefficient - Thermodynamics interpretation of law of mass action derivation of van't Hoff isotherm and isochore.Thermodynamic derivation of relation between concentration and elevation of boiling point and depression of freezing point.

Nernst heat theorem - Third law of thermodynamics - statement - Residual determination of absolute entropy of solids and gases - Exception to third law of thermodynamics.

### UNIT IV - SOLUTIONS

Raoult's law, Henry's law - Ideal and non - ideal solutions - Activity of a component in ideal solutions - chemical potential in ideal and Non - ideal solutions - Donnan membrane equilibrium - Gibbs – DuhemMargules equation - application - thermodynamics of ideal solution -  $\Delta G_{mix}$ ,  $\Delta H_{mix}$  of ideal solution (No derivation) - vapour pressure of real solution - deviation from Raoult's law - theory of fractional distillation - benzene - toluene system, Azeotropic mixture - ethanol - water, HCl - H<sub>2</sub>O, Immiscible liquids - theory of steam distillation - applications.

Solubility of partially miscible liquids - CST - Phenol - water, Triethylamine - water and nicotine - water systems - Crismer test

# UNIT V - PHASE RULE

Mathematical statement - definition of terms used - thermodynamic derivation - application of phase rule to one component system - Water, CO<sub>2</sub> and sulphur - Two component systems - condensed system and reduced phase rule - simple eutectic - Pb - Ag system - desilverisation of lead - KI - water system - Principle of freezing mixture.

Systems forming compounds with congruent and incongruent melting points - Sn - Mg and sodium sulphate - water systems.

Solid - Vapour equilibria - CuSO<sub>4</sub>.  $H_2O$  system, Deliquescent and Efflorescent

Nernst distribution law - thermodynamic derivation - molecular association and dissociation - application of distribution law to benzoic acid - benzene, and  $KI+I_2 \rightarrow KI_3$  system.

#### **REFERENCE BOOKS**

- 1. Kuriacose, Rajaram, Chemical Thermodynamics: Classical, Statistical, Irreversible, Pearson Education, 2013
- 2. Kapoor K.L., A Textbook of Physical Chemistry- Volume 1 (states of matter and ions in solution), 3<sup>rd</sup> Edition; Macmillan Publishers (Ltd.): New Delhi, 2001.
- 3. Kapoor K.L., A Textbook of Physical Chemistry- Volume 2 (Thermodynamics, Chemical Equilibrium), 3<sup>rd</sup> Edition; Macmillan Publishers (Ltd.): New Delhi, 1999.

- 4. Kapoor K.L., A Textbook of Physical Chemistry- Volume 3 (Applications of Thermodynamics), 3<sup>rd</sup> Edition; Macmillan Publishers (Ltd.): New Delhi, 2001.
- 5. Atkins, Paula, James *Physical Chemistry*, 11<sup>th</sup> Edition; Oxford University press: United Kingdom, 2018.
- 6. Arun Bahl, Bahl B.S., Tuli G.D., *Essentials of Physical Chemistry*, 28<sup>th</sup> Edition; S. Chand& Company Ltd: New Delhi, 2020.

CO	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Review the thermodynamic properties with respect to adiabatic changes	1,3	Understanding
CO-2	Elaboratethe I and II law of thermodynamics	1,3	Understanding
CO-3	Explore the concept of chemical potential and the III law of thermodynamics	1,3	Applying
CO-4	Classify the various laws pertaining to solution	1,3,5	Analyzing
CO-5	Evaluate the concept of Phase rule with one and two component systems	1,3,5	Evaluating

# **Course Outcomes**

Semester	Co C	ourse ode	1	Title of the Course				Hours	Cr	Credits	
V	21U	CCH51	Pł	iysical	Chem	istry-	II	75		4	
Course	]	Program	nme L	earnin	g		Progra	gramme Specific			
Outcomes		Outco	omes (	PLOs)	-		Outo	comes	PSOs)		
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	✓	✓		✓		✓		✓			
CO-2	✓	✓		✓		✓		✓			
CO-3	✓	✓	✓	✓		✓		✓	✓		
CO-4	✓	✓	✓	✓		✓	✓	✓	✓	✓	
CO-5	✓	✓		✓		✓	$\checkmark$	✓	✓	$\checkmark$	
	Number of matches ( $\checkmark$ ) = 34										
	Relationship = High										

	SEMESTER – V
<b>Course Title</b>	INORGANIC CHEMISTRY – III
Total Hrs.	60
Hrs./Week	4
Course Code	21UCCH52
Course Type	DSC-VIII
Credits	4
Marks	100

# \_\_\_\_\_

#### **General Objective:**

To acquire knowledge of metallurgy and to understand nuclear chemistry

#### **Course Objectives:**

CO No.	The learners will be able to :
CO-1	Classify acids and bases on the basis of different theories
CO-2	Compare Lanthanides and actinides, and their extraction
CO-3	Examine the isolation, structure and uses of Nobel gases
CO-4	Summarize the process of radioactivity and its measurement
CO-5	Assess the different nuclear reactions and its applications

#### UNIT I -Acids, bases and solvents

Theories of acids and bases: Arrhenius concept - Lowry - Bronsted concept - Lux Flood concept, Lewis Acid Bases theory - Usanovich concept. hard and soft acids and bases-HSAB principle.

Solvents - classification, characteristics of solvents (Dipole moment and dielectric constant) - liquid ammonia as a non aqueous solvent - Auto ionization, Amono acid, amono base, chemical reactions in liquid ammonia (Precipitation, Neutralization, solvolysis, complex formation and redox reactions) - solutions of alkali metals in liquid ammonia - Advantages and disadvantages.

#### **UNIT II -f-block elements**

Lanthanides - occurrence - general characteristics of Lanthanides -Lanthanide contraction and its consequences- Separation of lanthanides: solvent extraction, ion exchange, Uses of Lanthanides

Actinides - occurrence - general characteristics of actinides and comparison of lanthanides and actinides. Extraction and uses of Uranium and Thorium. Preparation, properties and uses of UF<sub>6</sub>, Zinc uranyl acetate, Ceric Ammonium Sulphate and Thorium Nitrate.

### **UNIT III -Noble gases**

Occurrence - Isolation of Noble gases from atmosphere (Chemical physical method, fractional method) and uses of noble gases. Properties of Helium – Preparation, structure and uses of XeF<sub>2</sub>, XeF<sub>4</sub>, XeF<sub>6</sub>, XeO<sub>3</sub>, XeOF<sub>4</sub>, XeO<sub>2</sub>F<sub>2</sub> and KrF<sub>2</sub>. Clathrates -types and uses.

#### **UNIT IV -Nuclear Chemistry-I**

Composition of nucleus - structure of the nucleus-shell model, liquid drop model - Meson theory- Nuclear stability - n/p ratio, mass defect, binding energy, packing fraction and magic numbers

Radioactivity – discovery, Types - detection and measurements of radioactivity (G.M.Counter and scitilation counter) – Kinetics of radioactivity – half life period – average life period - Theories of decay – Geiger Nuttal rule. Radioactive disintegration series (U, Th, Ac, Np).

### UNIT V -Nuclear Chemistry-II

Nuclear reactions - elastic, inelastic and spallation reactions- Q-value of nuclear reactions- thermonuclear reactions.

Nuclear fission - theory of nuclear fission; chain reaction, critical mass - energy released during fission - Uncontrolled fission - Principle of Atom bomb - Controlled fission - Atomic reactors - Thermal reactors and Fast Breeder reactors. Nuclear reactors in India

Nuclear fusion - Principle of Hydrogen bomb - Stellar energy - Differences between nuclear fission and nuclear fusion.

Applications of radioactive isotopes - Radio carbon dating -Radioactive hazards - neutron activation analysis, isotopic labeling studies, **REFERENCE BOOKS :** 

1. Arnikar, K.R. Essential of Nuclear Chemistry. New age publications

- 2. Cottan, F.A. Advanced Inorganic Chemistry. Wiley. 6thEdu.1996
- 3. Huhee, J. Inorganic Chemistry, pearson publication, 2012.
- 4. Lee, J.D. New Concise Inorganic Chemistry. ELBS 5th Ed.2002.
- 5. Madan, R.L., et.al. *Inorganic Chemistry.* S. Chand Co., Ltd. New Delhi. 2003
- 6. Malik, U. Et.al. Selected Topics in Inorganic Chemistry. S.Chand.
- 7. Puri, B.R. et.al. *Principles of Inorganic Chemistry*. Milestone publishers, New Delhi, 2007.
- 8. Sathya Prakash, G.D. et.al. *Advanced Inorganic Chemistry*, Vol. I & II, S. Chand and Company Pvt. Ltd, New Delhi, 2013

CO	Upon completion of the course, the	PSOs	Cognitive
No.	students will be able to :	Addressed	Level
CO-1	Identify Acids, Bases and solvents	1,3,5	Understanding
CO-2	Discuss the properties and uses of	1,3,5	Understanding
	noble gases, Lanthanides and		
	Actinides		
CO-3	Explore basic concepts of nuclear	1,3,5	
	chemistry and Inspectvarious methods		Applying
	of detection of radioactivity		
CO-4	Classify the types of nuclear reactions	1,3,4,5	Analyzing
	and create awareness on nuclear		
	hazards		
CO-5	Explain the extraction of Th, U and	1,3,4,5	Evaluating
	lanthanide contraction		

#### **COURSE OUTCOMES**

Semester	Cour	se Co	de	Title of the Course				Hours	Cre	edits	
v	21UCCH52			INORGANIC CHEMISTRY			<b>FRY</b>	60		4	
				– III							
Course	F	rogra	mme ]	Learnir	ıg		Progra	umme S	pecific	;	
Outcomes		Outc	omes	(PLOs)			Outo	omes (I	PSOs)		
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO	
	1	2	3	4	5	1	2	3	4	5	
CO-1	✓		✓		✓	✓		<ul> <li>✓</li> </ul>		✓	
CO-2	✓		✓		✓	✓		✓		✓	
CO-3	✓		✓		✓	✓		<ul> <li>✓</li> </ul>		$\checkmark$	
CO-4	✓		✓	✓	✓	<ul> <li>✓</li> </ul>		<ul> <li>✓</li> </ul>	✓	<ul> <li>✓</li> </ul>	
CO-5	✓		✓		✓	<ul> <li>✓</li> </ul>		<ul> <li>✓</li> </ul>		$\checkmark$	
			Nur	ber of a	matche	es (√) =	<b>32</b> (M	ledium)			
	Relationship = Low/Medium/High										
					-	,	,	2			

# **RELATIONSHIP MATRIX**

Course Title	SPECTROSCOPY
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UCCH53
Course Type	DSC-IX
Credits	4
Marks	100

# **General Objectives:**

This course focuses on molecular spectroscopy, IR, UV, NMR, ESR and Mass spectra

#### Course Objectives:

CO	The learners will be able to :
CO-1	Remember the principle and selection rule of different molecular
	spectroscopy
CO-2	Apply the concept of normal modes of vibration
CO-3	Distinguish the important role of nuclear magnetic resonance
	spectroscopy in the study of the structures of organic
	compounds
CO-4	Correlate the principle of NMR and apply it to simple molecules.
CO-5	Evaluate the fragmentation pattern and identify molecular ion
	peak and base peak in a mass spectrum.

#### UNIT I MOLECULAR SPECTROSCOPY-I

Electromagnetic radiation – Born-Oppenheimer approximation - Types of molecular energies – Various types of molecular spectra.

Rotational spectroscopy – Principle, selection rule, intensity and application of bond length of a diatomic molecule and linear triatomic molecule – Effect of isotopic substitution.

Vibrational spectroscopy – Principle, selection rule – Simple Harmonic Oscillator – Anharmonicity – determination of force constant – modes of vibration -  $CO_2$  and  $H_2O$ 

# UNIT II MOLECULAR SPECTROSCOPY II

Vibration-rotation spectroscopy - P,Q,R branches – Overtones and Fermi resonance.

Raman spectroscopy – quantum theory – selection rule – Mutual exclusion rule – Application to  $CO_2$  and  $H_2O$  molecules.

Electronic spectroscopy – Principle, selection rule - Franck Condon principle – Rotational fine structure of Electronic – vibration spectra.

### UNIT III APPLICATION OF IR and UV SPECTROSCOPY

Infrared Spectroscopy – vibrational frequencies – factors influencing vibrational frequencies – finger print region – Application of IR spectra of alkanes, alkenes, alcohols and phenols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acid, amines, nitriles and amides.

Ultraviolet spectroscopy – types of electronic transitions – Selection rule – chromophore, auxochrome, bathochromic shift, hypsochromic shift,

hyperchromic shift, hypochromic shift – Solvent effect - Woodward Fischer rule - Calculation of absorption maxima ( $\lambda_{max}$ ) of conjugated dienes and a,  $\beta$  - unsaturated carbonyl compounds – Scott rule – Derivatives of acyl benzenes – Calculation of Double Bond Extending Conjugation.

### UNIT IV NMR SPECTROSCOPY

NMR – Principle – Larmor Precision - Signals – Chemical shift -Factors affecting Chemical Shift - Shielding and deshielding – TMS as a reference - Spin-Spin interaction – Coupling constant – Application of NMR to Ethanol, Butanol, Acetaldehyde, Benzaldehyde, Ethylmethyl ketone, Ethylacetate, Nitromethane, Salicylic acid and Aniline - First order and second order spectra

# UNIT V ESR AND MASS SPECTRA

ESR spectroscopy – principle - hyperfine splitting – ESR spectrum of hydrogen atom,  $CH_3$  radical, deuterium and benzene anion radical - Applications of ESR- Differences between NMR & ESR

Mass spectrometry - Principle - Important useful terms in mass spectrometry: Mass spectrum, Base peak, Molecular ion and parent ion, mass to charge ratio (m/z), relative intensity, fragment ions, doubly charged ions, metastable ions- Even electron rule, Nitrogen rule and Mclafferty rearrangement - General Modes of fragmentation -Mass spectrum of benzene, naphthalene, 1-butanol, phenol, benzaldehyde and cyclohexanone.

# **REFERENCE BOOKS:**

- 1. Aruldhas G. *Molecular structure and spectroscopy*: Prentice Hall of India: 2005.
- 2. Banwell C.N. *Fundamentals of molecular spectroscopy*: Tata McGraw Hill Publishing Company: Mumbai, 2000.
- 3. Chatwal G.R. *Spectroscopy*, 5<sup>th</sup> Edition: Himalaya Publishing House: Mumbai, 2017.
- 4. Donald L.Pavia, Gary M. Lampman, George S. Kriz, James R. Vyvyan. *Introduction to spectroscopy*, 5<sup>th</sup> edition: Cengage Learning: USA, 2005.
- 5. Jag Mohan, Organic spectroscopy Principles and Applications, 2<sup>nd</sup> edition: Narosa Publishing House: New Delhi, 2009.
- 6. Robert M. Silverstein, Spectrometric Identification of Organic compounds, 7<sup>th</sup> edition: John Wiley & sons: USA, 2005.

	Course Outcom	es	
СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Determine bond lengths of linear diatomic and triatomic molecule by using information from rotational spectroscopy	1,3,5	Understanding
CO-2	Illustrate IR spectrum of compounds	1,3,5	Applying
CO-3	Identify molecular ion peak, base peak and the fragmentation pattern of a sample in a mass spectrum.	1,3,5	Analyzing
CO-4	Analyse structures to simple molecules based on nuclear magnetic resonance spectra.	1,3,5	Analyzing
CO-5	Evaluate $\lambda_{max}$ values using UV spectroscopy	1,3,5	Evaluating

Semester	Course Code			Title of the Course			Hours		Credits	
V	210	JCCH5	3 🖁	SPECTR	OSCO	PY	60		4	
Course	] ]	Program	nme 🛛	Learning	3		Progra	mme	Specifi	с
Outcomes		Outco	omes	(PLOs)			Outo	omes	(PSOs)	
(COs)	PLO	PLO	PLO	PLO	PLO	PS	O PSO	PSO	PSO	PSO
	1	2	3	4	5	1	2	3	4	5
CO-1	✓		✓		✓	<ul> <li>✓</li> </ul>		✓		✓
CO-2	✓		✓		✓	√		✓		✓
CO-3	✓		✓		✓	<ul> <li>✓</li> </ul>		✓		✓
CO-4	✓		✓		✓	<ul> <li>✓</li> </ul>		✓		✓
CO-5	✓		✓		✓	<ul><li>✓</li></ul>		✓		✓
				Number Relati	of mat onship	ches = M	s (√) = 3 edium	0		

### SEMESTER – V

Course Title	PHYSICAL CHEMISTRY PRACTICAL
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UCCH5P1
Course Type	Practical-V
Credits	2
Marks	100/2

### **General Objectives:**

This course focuses on the determination of molecular weight, solubility, dissociation constant of a substance and to perform conductometric and potentiometric titrations.

# Course Objectives:

СО	The learners will be able to :
CO-1	Identify the molecular weight and solubility of a substance
CO-2	Construct the phase diagram
CO-3	Examine conductometric and potentiometric titrations
CO-4	Explore buffer solutions
CO-5	Evaluate the adsorption isotherm

Ι.

1. Determination of molecular weight of non -volatile solute by Rast macro method.

2. Determination of molecular weight of a solute by transition temperature method.

3. Construction of the phase diagram of a simple eutectic system and interpretation of the diagram.

4. Determination of CST of phenol – water system. Study of effect of impurity on CST and unknown NaCl solution.

5. Determination of the solubility of a substance at different temperature and calculate the heat of solution.

6. Kinetic study of ester hydrolysis.

# II.1. Conductometric titration:

a. Estimation of HCl providing the strength of NaOH solution.

b. Estimation of BaCl<sub>2</sub> providing the strength of MgSO<sub>4</sub>.

c. Estimation of CH<sub>3</sub>COOH providing the strength of NaOH.

d. Estimation of Ba(OH)<sub>2</sub> providing the strength of MgSO<sub>4</sub>..

# 2. Potentiometric titrations:

a. Estimation of Fe<sup>2+</sup> using standard KMnO<sub>4</sub> solution.

b. Estimation of KMnO<sub>4</sub> using standard FAS

c. Estimation of HCl using standard NaOH solution.

3. Determination of molar/equivalent conductance of weak electrolyte and calculation of its dissociation constant.

4. Preparation of buffer solution of given pH using Henderson equation.
a. acetic acid – sodium acetate

b. ammonium chloride – ammonium hydroxide

#### Course Work

1. Study of Adsorption of acetic acid / oxalic acid on activated charcoal and verification of Freundlich/Langmuir isotherm.

2. Partition coefficient –distribution of dissociation constant.

## **REFERENCE BOOKS:**

- 1. Patel H.N. College Practical Chemistry: Himalaya Publishing House: India, 2010.
- 2. Vogel A.I., Jeffery G.H. *Vogel's textbook of Quantitative Chemical Analysis*, 5<sup>th</sup> edition: Longman Scientific and Technical: New York, 1989.

	Course Outcomes									
CO	Upon completion of the course, the	PSOs	Cognitive							
	students will be able to :	Addressed	Level							
CO-1	Compute the molecular weight of a solute.	1,2,3,4	Understanding							
CO-2	Construct phase diagram	1,2,3,4	Applying							
CO-3	Analyse the kinetics of a reaction	1,2,3,4	Analyzing							
CO-4	Measure the heat of solution and solubility of any compound	1,2,3,4	Evaluating							
CO-5	Estimate the strength of solution by conductometric and potentiometric titrations	1,2,3,4	Evaluating							

## **Course Outcomes**

Semester	Cour	se Code	e	Title of the Course					irs (	Credits
V	2100	CCH5P1		PHYSIC P	CAL CH PRACTI	60	)	2		
Course Outcomes	]	Progran Outco	nme Le omes (l	earning PLOs)	ing Programme Specific s) Outcomes (PSOs)					
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO
· ·	1	2	3	4	5	1	2	3	4	5
CO-1	✓	✓	✓	✓		<ul><li>✓</li></ul>	✓	✓	✓	
CO-2	✓	✓	✓	✓		✓	✓	✓	✓	
CO-3	✓	✓	✓	✓		✓	✓	✓	✓	
CO-4	✓	✓	✓	✓		✓	✓	✓	✓	
CO-5	✓	✓	✓	<ul> <li>✓</li> </ul>		<ul><li>✓</li></ul>	✓	✓	✓	
		Number of matches $(\checkmark) = 40$ Relationship = High								

#### SEMESTER - V

Course Title	GRAVIMETRIC ESTIMATION AND INORGANIC MIXTURE ANALYSIS
Total Hrs.	60
Hrs./Week	4
Course Code	21UCCH5P2
Course Type	PRACTICAL-VI
Credits	2
Marks	100/2

#### General Objective:

To elaborate the analysis of metal ion by Qualitative and Gravimetric method

#### **Course Objectives:**

СО	The learners will be able to :
CO-1	Review the concentration of metal ions by gravimetric method
CO-2	Ascertain the Acid radical present in the given inorganic mixture
CO-3	Explore the interfering and non-interfering of acid radicals
CO-4	Recognize the metal ions in the given inorganic sample by systematic qualitative analysis
CO-5	Consolidate the metal ions into the individual group

#### A. 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 Zinc as Zinc oxinate
- 5. Estimation of Nickel as Nickel Dimethyl glyoximate
- 6. Estimation of Copper as Copper thiocyanate [ Course Work]

#### **B.** Inorganic Mixture Analysis

Systematic Qualitative analysis of a mixture containing two anions and two cations. One of the anions should be an interfering radical which should be eliminated. The two cations should be of different groups. The following combination of inorganic salts should be avoided

- Mixture containing sulphates along with group V cations,
- Mixture which need fusion,
- Mixture containing oxalate and carbonate and
- Mixture containing an oxidizing and a reducing group

The micro techniques method of analysis is recommended. However, the semi micro technique is also permitted.

Simple Anions:	Cations
1.Carbonate	Group I
2. Sulphate	1.Lead
3. Nitrate	Group II
4. Chloride	2.Copper
5. Bromide	3.Cadmium
Interfering Anions	Group III
6.Oxalate	4.Antimony
7.Borate	5.Aluminium
8.Fluoride	Group IV
9.Phosphate	6.Nickel
	7.Zinc
	8.Manganese
	Group V
	9.Barium
	10.Strontium
	11.Calcium
	Group VI
	11.Magnesium
	12.Ammonium

#### **REFERENCE BOOKS :**

- 1. Patel H.N., College *Practical Chemistry*, Himalaya Publishing House: New Delhi, 2010.
- 2. Jeffery, Vogel's textbook of Quantitative Chemical Analysis, 5<sup>th</sup> Edition; Longman Scientific and Technical: New York, 1989.
- 3. RamanujamV.V., *Inorganic Semi Micro Qualitative Analysis*, 3rd Edition; The National Publishing Company: Chennai, 1974.

	Course Outcome	S	
CO	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Infer the concentration of metal ions by gravimetric method	1,2,3,5	Understanding
CO-2	Determine the Acid radical present in the given inorganic mixture	1,2,3,5	Applying
CO-3	Compare the interfering and non- interfering acid radicals.	1,2,3,5	Analyzing
CO-4	Identify the metal ions in the given inorganic sample by systematic qualitative analysis.	1,2,3,5	Analyzing
CO-5	Distinguish the metal ions into the individual group.	1,2,3,5	Evaluating

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Semester	Cours	se Code	Title of the Course					Hou	ırs	Cr	edits
V	21UCCH5P2		GF	RAVIM	ETRIC	ANAL	YSIS,	60		2	
			AND INORGANIC MIXTURE								
				A	NALY	<u>SIS</u>					
Course	F	Program	me Le	earning	g	נן	Progra	mme S	Spec	ific	;
Outcomes		Outcom	mes (I	PLOs)			Outco	omes (	PSO	)s)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSC	04	PSO5
CO-1	✓	✓	✓	✓		<ul><li>✓</li></ul>	✓	√			✓
CO-2	✓	√	✓	✓		<ul> <li>✓</li> </ul>	✓	✓			✓
CO-3	✓	✓	✓	✓		<ul><li>✓</li></ul>	✓	✓			✓
CO-4	✓	√	✓	✓		<ul><li>✓</li></ul>	✓	$\checkmark$			✓
CO-5	✓	✓	✓	✓		✓	<				
			N	umber	of mat	tches (	√) = 38	3			
	Relationship = High										
						-	C				

#### SEMESTER - V

<b>Course Title</b>	POLYMER CHEMISTRY
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UECH51A
Course Type	DSE-I-A
Credits	4
Marks	100

#### **General Objectives:**

This course describes the Polymers, its types, techniques involved in polymerization, synthesis, physical properties, biomedical applications, degradation and processing of polymers

#### **Course Objectives**:

CO	The learners will be able to :
CO-1	Distinguish a polymer on the basis of the structure and properties
CO-2	Elaborate the wide range of reagents applied in polymerization reactions
CO-3	Obtain knowledge of the different types of polymers and their applications.
CO-4	Point out the wide applications of polymers in bio-medicine.
CO-5	Determine the different mechanical and crystalline properties of polymers and processing of polymers based on their properties.

#### UNIT I - Polymer and its types

Polymer- Classification based on Structure, Application and Tacticity-Types- Homo and Copolymer – Distinction among plastics, elastomers and fibers. – Functionality, Degree of polymerization - Types of polymerization addition, condensation and chain polymerization (Mechanism not required).

#### **UNIT II – Polymerization Techniques and Rubbers**

Bulk, Suspension, Emulsion and Solution polymerization Poly condensation techniques- melt polycondensation, solution polycondensation and interfacial condensation.

Bulk and Emulsion polymerization: polymerization of Styrene.

Precipitation polymerization: Polymerization of acrylonitrile.

Suspension polymerization: Polymerisation of methyl methacrylate.

Melt polycondensation: Preparation of Kevlar.

Solution polycondensation: Preparation of Polyacrylonitrile (PAN).

Interfacial polycondensation: Reaction of terephthaloyl chloride and ethylene diamine – Isolation and purification of polymers

Vulcanization of rubber, preparation and uses of synthetic rubbers: BUNA-S, BUNA-N and neoprene rubber.

#### **UNIT III - Synthetic Polymers**

Synthesis, properties and uses of - Polyethylene - HDPE, LDPE, LLDPE - Polypropylene - Polyvinyl chloride – Teflon - Polyvinyl acetate - Poly vinyl fluoride, Polyamides: Nylon 6, Nylon 6,6 and Nylon 11 - Polyester resins, Alkyd resins.

Resins: Preparation, properties and uses of Melamine formaldehyde and urea formaldehyde resins and Epoxy resins.

Cellulose esters: Preparation, properties and uses of Cellulose acetate and Cellulose nitrate.

#### **UNIT IV - Physical States and Biomedical Applications**

Molecular mass - number average, weight average, viscosity average molecular mass - Determination of molecular mass by viscosity and light scattering method - practical significance of molecular mass distribution size of polymers. Kinetics of free radical polymerization - Carothers's equation - Bio - medical applications of polymers.

#### **UNIT V – Physical Properties, Degradation and Processing**

Glassy state - glass transition temperature, factors affecting glassy state - crystallinity in polymers.

Viscosity, Solubility, Optical, Electrical, Thermal and Mechanical properties of polymers.

Degradation of polymers by thermal, oxidative, mechanical and chemical methods.

Polymer processing:

Compression moulding-Torlon [Polyamide-imides] Injection moulding – Polyethylene and Polystyrene Transfer moulding – Polyurethanes or Epoxy resins Extrusion moulding - Polypropylene Blow moulding - Polyethylene Terephtalate (PET) and dye casting.

#### **REFERENCE BOOKS:**

- 1. Alka Gupta L., *Polymer Chemistry*, Pragati Prakashan, Anu Books, 2019.
- 2. Billmeyer F.W., *Text Book of Polymer Science*, A Wiley–Inter science Publication, 3<sup>rd</sup> Edition, John Wiley & Sons New York, 2007.
- 3. Nayak P.L. & Lenka S., *Text Book of Polymer Science*, Kalyani publishers, New Delhi, 2000.
- 4. Bhatnagar M. S., *A Textbook of Polymer Chemistry*, S Chand Publishing; First edition, 2004, ISBN-10: 8121941121.
- 5. Carraher Jr. C. E., Introduction to Polymer Chemistry, 4th Edition, CRC Press, 2017, ISBN-13: 978-14987,37616
- 6. Gowarikar V.R., Viswanathan N.V. and Sreedhar J., *Polymer Science*; New Age International (P) Ltd., New Delhi, 2000.

## **Course Outcomes**

СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Distinguish the types of polymers, various polymerization techniques and different molecular masses of polymers	1,5	Understanding
CO-2	Explain the synthesis and uses of polymers by suitable polymerization reactions	1,3,5	Understanding
CO-3	Illustrate the practical significance of the molecular mass distribution in polymers	1,5	Applying
CO-4	Compare the different types of polymers and their applications.	1,3,5	Analyzing
CO-5	Evaluate the physical properties of polymers and their importance	1,3,5	Evaluating

Semester Course Code		e	Title of the Course			Hour	'S	Credits		
V	21UECH51A			POLYMER CHEMISTRY			60		4	
Course	P:	rogram	me Le	arning	ç	נן	Progra	mme \$	Specifi	C
Outcomes		Outco	mes (F	PLOs)			Outco	omes	(PSOs)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓			✓	✓	✓				✓
CO-2	✓	✓		✓	✓	✓		✓		✓
CO-3	✓	✓	✓	✓	✓	<ul><li>✓</li></ul>				✓
CO-4	✓			<ul> <li>✓</li> </ul>	✓	<ul><li>✓</li></ul>		<ul> <li>✓</li> </ul>		✓
CO-5	✓	✓	✓		✓	✓		✓		✓
	Number of matches ( $\checkmark$ ) = 32									
		Relationship = Low/Medium/High								

#### SEMESTER - V

<b>Course Title</b>	CHEMISTRY OF MATERIALS
Total Hrs.	60
Hrs./Week	4
Course Code	21UECH51B
Course Type	DSE-I-B
Credits	4
Marks	100

#### General Objectives:

This course emphasises on the properties of crystalline solids, silicates, preparation of inorganic solids, ionic solids, nano materials and composites.

#### **Course Objectives**:

CO	The learners will be able to :							
CO-1	Describe the crystalline solids – parameters and symmetry							
CO-2	Distinguish the Silica based materials in applications							
CO-3	Identify the Technological importance of ionic liquidsand preparation of materials– using sol-gel technique							
CO-4	Brief the Nano-structured materials and self-assembled structure.							
CO-5	VerifyComposites and its applications							

#### Unit I : Crystalline solids

Crystalline solids, crystal systems, Bravais lattices, coordination number, packing factors – cubic, hexagonal, diamond structures, lattice planes, Miller indices, interplanar distances, directions, types of bonding , lattice energy, Madelung constants, Born Haber cycle, cohesive energy, Symmetry elements, operations , translational symmetries - point groups, space groups, equivalent positions, close packed structures, voids, crystal structures, Pauling rules, defects in crystals, polymorphism, twinning.

#### Unit II: Silica based materials

Introduction to Zeolites, metallosilicates, silicalite and related microporous materials,

Mesoporous silica, metal oxides and related functionalized mesoporous materials: Covalent organic frameworks, Organic-Inorganic hybrid materials, periodic mesoporous organosilica, metal organic frameworks:  $H_2$  /CO<sub>2</sub> gas storage and catalytic applications

#### Unit III: Inorganic solids/ionic liquids of technological importance:

Preparation of inorganic solids: Conventional heat and beat methods, Co-precipitation method, Sol-gel methods, Hydro-thermal method, Ionexchange and Intercalation methods. Introduction to Solid electrolytes, inorganic liquid crystals. Ionic liquids, forces responsible for ionic liquids, synthesis and application of imidazolium and phosphonium based ionic liquids. Host-guest chemistry (elementary ideas).

#### Unit IV: Nanomaterials

Overview of nanostructures and nano-materials: classification. Preparation of gold and silver metallic nanoparticles, self-assembled nanostructures-control of nano-architecture-one dimensional control. Carbon nanotubes and inorganic nanowires.

#### **Unit V: Composite materials**

Introduction, limitations of conventional engineering materials, role of matrix in composites, classification, matrix materials, reinforcements, metal-matrix composites, polymer-matrix composites, fibre-reinforced composites, environmental effects on composites, applications of composites.

#### **REFERENCES:**

1. Atkins P., Overton T., Rourke J. Weller M. and Armstrong F Shriver and Atkins. *Inorganic Chemistry*, Oxford University Press, Fifth Edition, 2012.

2. Adam, D.M. Inorganic Solids: An introduction to concepts in solid-state structural chemistry. John Wiley, 1974.

3. Poole, C.P. & Owens, F.J. Introduction to Nanotechnology John Wiley 2003.

4. Rodger, G.E. Inorganic and Solid-State Chemistry, Cengage Learning, 2002

СО	Upon completion of the course, the	PSOs	<b>Cognitive Level</b>
	students will be able to :	Addressed	
CO-1	Explain the basic parameters of	1,5	Understanding
	crystalline solids, symmetry and crystal structures.		
CO-2	Describe the silica-based materials, functionalized hybrid materials, inorganic solids, ionic liquids and their applications.	1,3,5	Understanding
CO-3	Determine the self-assembled structures, nano-structured materials, carbon nanotubes, applications.	1,3,5	Applying
CO-4	Compare the preparative methods of inorganic solids, ionic liquids nanomaterials, composites and their significance	1,3,5	Analyzing
CO-5	Verify the importance of silica-based materials, nano compounds, compositesfor their role in industrial applications.	1,3,5	Evaluating

#### **Course Outcomes**

Semester	Course Code		le	Title Cou	of the irse		Hour	s	Cred	its
v	21UECH51B			CHEMISTRY OF MATERIALS			60		4	
Course	] ]	Progran	nme l	Learning	g	Programme Specific				с
Outcomes		Outco	omes	s (PLOs)			Outc	omes	(PSOs)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓				✓	✓				✓
CO-2	✓				✓	✓		✓		✓
CO-3	✓	✓	✓		✓	✓		✓		✓
CO-4	✓				✓	✓		✓		✓
CO-5	✓				✓	<ul> <li>✓</li> </ul>		✓		✓
		Number of matches $(\checkmark) =26$								

Semester	- V
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Course Title	FOOD CHEMISTRY
Total Hrs.	60
Hrs./Week	4
Course Code	21UECH51C
Course Type	DSE-I-C
Credits	4
Marks	100

#### General Objectives:

This course elaborates on the fundamentals offood chemistry and the details regarding adulteration, food additives, prevention of adulteration and the quality standards to be followed for food materials.

00000000										
СО	The learners will be able to :									
CO-1	Describes the constituents of food and their analysis									
CO-2	Explain the adulterants used in the food and their effects									
CO-3	Illustrate the different types of food additives and their limited ranges of adding it in food.									
CO-4	Determine the various types of beverages and their effects									
CO-5	Comprehend the different quality standards given for food materials.									

#### **Course Objectives**:

#### **Unit-I Constituents of food**

Introduction, Classification of Carbohydrates. Qualitative analysis of amino acids - Glycine, tyrosine, tryptophan, arginine and cysteine. Carbohydrates -Qualitative analysis of monosaccharides (glucose, fructose, galactose) Quantitative Analysis of proteins - Estimation of protein by colorimetric method & Estimation of protein in milk by Kjheldal method and Estimation of Ascorbic acid (vitamin C) using sodium-2,6-dichloroindophenol dye.

#### **Unit- II Food Adulteration**

Definition - adulterant, adulteration: Common adulterants in different foods – milk and milk products, vegetable oils, and fats, oils, honey, chilly powder, coriander powder, turmeric powder, coffee powder, tea dust, asafoetida. Contamination with toxic chemicals – pesticides and insecticides. Principles involved in the analysis of detection and prevention of food adulteration. – Prevention of Food Adulteration Act- food laboratories and their functions

#### Unit– III Food additives:

Food additives: Definition - permitted food additives, characteristics and their role: antioxidants, stabilizers, flavours, sweeteners, emulsifiers, thickeners, food colourants. Preservatives: Definition – methods of food preservation - heat, cold, deep-freezing, radiation

Artificial sweeteners – saccharin, sodium cyclamate, aspartame – food flavours, – esters, aldehydes and heterocyclic compounds

Food colours – changes in cooking. Restricted use. Spurious colours. Emulsifying agents, preservatives – leaveningagents. Baking powder –Yeast. Taste enhancers – MSG-vinegar

#### Unit– IV Beverages

Beverages - definition and examples - Classification of beverages-Fruit beverages - Milk based beverages - malted beverages - examples.Alcoholic and non-alcoholic beverages - Soft drinks, Soda - Carbonation. Addiction to alcohol. Cirrhosis of liver. Social problems. Composition of soft drinks. Excessive use leading to urinary bladder stones. Preservation of tetrapak. Nitrogen preservation and packing of fruit juices. Coconut water.

#### Unit- V Quality control:

Specifications and standards: PFA, FPO, FDA, WHO standards, ISI specifications, packing and label requirements, essential commodities act, consumer protection act. AGMARK.

#### **Reference Books :**

- 1. Swaminathan Advanced Text Book on Food and Nutrition,volume I and II Printing and Publishing CO., Ltd., Bangalore. *1993.*
- 2. Swaminathan M. Text Book on Food chemistry, Printing and Publishing CO., Ltd., Bangalore. 1993.
- 3. Norman N. Potter, Food science, CBS publishers and distributors, New Delhi. 1994.
- 4. Lillian Hoagland Meyer, Food Chemistry, CBS publishers and distributors, New Delhi. 1994.
- 5. Owen R Fennema, Food Chemistry, Marcel Decker Inc., New York. 1996.
- 6. Srilakshmi B., Food Science, New age International Pvt. Ltd. Publishers, III ed. 2003.
- 7. Siva Sankar B., Food Processing and Preservation. Prentice Hall of India Pvt. Ltd., NewDelhi. 2002.
- 8. Ramakrishnan S., Prasannam K.G and Rajan R –Principles. Text book of Medical Biochemistry.Orient Longman Ltd. III ed. 2001.
- 9. Shakuntala Manay N. and Shadaksharaswamy M. Foods: Facts and Principles. New ageInternational Pvt. Ltd. Publishers, II ed. 2002.

	Course Outcomes									
СО	Upon completion of the course, the	PSOs	Cognitive							
	students will be able to :	Addressed	Level							
CO1	Understand the basic components of Food	1,3,5	Understanding							
CO2	Identify Adulterations in Food	1, 2,4,5	Applying							
CO3	Categorize the additives used in the Food	1,3,5	Analysing							
CO4	Interpret the side effects of the Beverages	1,2,4	Evaluating							
CO5	Discuss the protocols to be maintained for	1,3,4,5	Creating							
	the standards of Food and Food packing									
	materials									

Semester	Cou	rse Cod	le	Title	of the	Course	•	Hours	Cr	edits
v	210	JECH51	C	FOOD CHEMISTRY				60		4
Course Outcomes	Prog	Programme Learning Outcomes Programme Specific (PLOs) (PSOs)					ic Outo	comes		
(COs)	PLO1	PLO2	PLO3	3 PLO4	PLO5	PSO1	PSO	2 PSO3	PSO4	PSO5
CO-1	~				~	$\checkmark$	~	~	~	~
CO-2	~	$\checkmark$	~		$\checkmark$		~		√	
CO-3		~	~		~	~		~		~
CO-4	~			~	~		~		√	~
CO-5				~	~	$\checkmark$	<b>√</b>	✓		$\checkmark$
				Number Relat	r of mat ionship	ches (v = Med	⁄) = 3 lium	31		

#### SEMESTER - V

Course Title	INSTRUMENTAL METHODS OF ANALYSIS
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UECH52A
Course Type	DSE-II-A
Credits	4
Marks	100

#### **General Objectives:**

This course outlines on the principle, instrumentation and applications of thermoanalytical methods, electroanalytical methods and spectral techniques.

#### **Course Objectives**:

CO	The learners will be able to :								
CO 1	Explain the principle, instrumentation and applications of								
00-1	thermoanalytical methods								
CO 2	Describe the principle, instrumentation and applications of								
0-2	electroanalytical methods								
CO-3	Illustrate the applications of spectrophotometric techniques								
CO-4	Differentiate atomic absorption and emission spectroscopy								
CO-5	Explain instrumentation and applications of IR, Raman and								
	NMR								

#### UNIT I THERMO ANALYTICAL METHODS

Thermo Gravimetric Analysis (TGA) – Principle, instrumentation, Factors affecting TGA and its applications - TGA of Calcium oxalate monohydrate.

Differential Thermal Analysis (DTA) – Principle, instrumentation and applications – DTA of Calcium oxalate monohydrate – Comparison of TGA and DTA curves.

Differential Scanning Colorimetry (DSC) – Principle, instrumentation and application.

Thermometric titrations – Principle and applications.

#### UNIT II ELECTROANALYTICAL METHODS

Electro Gravimetric Analysis – Principle, instrumentation and applications – Estimation of metal ions ( $Cu^{2+}$  and  $Ni^{2+}$ ).

Coulometric analysis – Principle, instrumentation and applications – Coulometric titration.

Polarography – principle – dropping mercury electrode –applications – Polarographic curves – applications to qualitative and quantitative analysis.

Amperometric titrations – Principle and applications.

#### UNIT III COLORIMETRIC AND SPECTROPHOTOMETRIC ANALYSIS

Colorimeter – Principle, instrumentation and Applications.

Spectrophotometer – Principle, instrumentation - Single beam and Double – beam Spectrophotometer – Applications.

Fluorometry – Principle, instrumentation and applications

Nephelometry and turbidimetry – Principle, Instrumentation and applications – turbidimetric titrations.

# UNIT IV FLAME EMISSION, ATOMIC ABSORPTION AND EMISSION SPECTROSCOPY

Flame photometry – Principle, instrumentation and applications.

Atomic absorption spectroscopy – Principle, instrumentation, spectral and chemical interferences and applications (Chromium in steel and Calcium in blood serum).

Atomic Emission spectroscopy – Principle, instrumentation and applications.

#### UNIT V IR, RAMAN AND NMR SPECTROSCOPY

IR spectroscopy – Instrumentation and application – sampling techniques.

Raman spectroscopy – Instrumentation, application and comparison of IR and Raman Spectroscopy

NMR spectroscopy – Instrumentation and Applications - MRI.

#### **REFERENCES BOOKS :**

- 1. Gurdeep R. Chatwal and Sham Anand. Instrumental Methods of Chemical Analysis: Himalaya Publishing House: Mumbai, 2017.
- 2. Hobart H. Willard, Lynne L. Merritt Jr, John Dean, *Instrumental Methods of Analysis*, 7<sup>th</sup>Edn.: Wadsworth Publishing Co Inc.: United States, 1988.
- 3. Judith F. Rubinson. *Contemporary Chemical Analysis*: Prentice Hall: India, 1998.
- 4. Sharma B.K. *Instrumental Methods of Analysis*: Gel publishing House: Meerut, 2011.
- 5. Skoog D.A., West D.M., Holler F.J. and Crouch S.R. *Fundamentals of Analytical Chemistry*: Thompson Asia Private Ltd.: Bangalore, 2004.

	Course Outcomes									
СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level							
CO-1	Discuss the principle, instrumentation and application of various thermoanalytical, electroanalytical, colorimetric, spectrophotometric, absorption and emission spectroscopy.	1,2,3,5	Understanding							
CO-2	Describe the instrumentation of IR, Raman and NMR spectroscopy	1,5	Understanding							
CO-3	Utilize the NMR principle in MRI	1,3,5	Applying							
CO-4	Analyse the metal ions using atomic absorption spectrophotometer	1,2,3,5	Analyzing							
CO-5	Compare TGA and DTA curves, IR and Raman spectroscopy	1,5	Evaluating							

Semester	ter Course Code Title of the Course				Hours	Cre	Credits			
v	21UE	CH52	ł	INST	RUME	NTAL		60		4
			ME	THOD	S OF A	NALY	SIS			
Course	F	Program	nme Lo	earning	g	J	Progra	mme S	Specifi	С
Outcomes		Outco	omes (I	PLOs)	-		Outo	omes (	PSOs)	
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	
	1	2	3	4	5	1	2	3	4	5
CO-1	✓	✓	✓		✓	✓	✓	✓		<ul> <li>✓</li> </ul>
CO-2	✓				✓	✓				<ul> <li>✓</li> </ul>
CO-3	✓		✓		✓	✓		✓		✓
CO-4	✓	√	✓		✓	✓	✓	✓		<ul> <li>✓</li> </ul>
CO-5	✓				✓	✓				<ul> <li>✓</li> </ul>
			N	umber	of mat	tches (	✓) = 3	0		
				Relati	onship	= Med	lium			

#### SEMESTER - V

<b>Course Title</b>	MEDICINAL CHEMISTRY
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UECH52B
Course Type	DSE-II-B
Credits	4
Marks	100

#### **General Objectives:**

This course describes the drug metabolism, medical diagnostic instruments, blood analysis, causes of diseases and their treatment.

#### **Course Objectives**:

CO	The learners will be able to :								
CO-1	Describe the classification and metabolism of drugs.								
CO-2	Explore the idea of metabolic reactions.								
CO 3	Illustrate the working principle of common medical								
0-5	instruments.								
CO-4	Identify different blood groups based on composition.								
CO-5	Evaluate quantitively the glucose and urea present in the blood by different methods.								

#### **UNIT I- Concepts and metabolism of drugs**

Concepts: Classifications of drugs – biological and chemical classification nomenclature of drugs – International Non-proprietary names (INNs).

Metabolism of drugs: Factors affecting metabolism - chemical pathway of drug metabolism – bio transformation - oxidative, reductive and hydrolytic bio transformations – conjugate reactions – glucouranides, amino acids, ethereal sulphate, methylated, acetylated and glucothione conjugations. Absorption of drugs – routes of administration – factors affecting absorption. Assay of drugs: Chemical, biological and immunological assay.

#### **UNIT II - Diagnostic Medical Instruments**

Design of medical instruments – general components – transducers – types – biopotential recorders – Electrocardiograph(ECG) – principles, block diagram, measurement and analysis of the ECG, X-ray - Principle, block diagram, measurement and analysis. Ultrasonic Scanning principle, block diagram, measurement and analysis of the scans. C.T.Scan - principle, block diagram, measurement and analysis.

#### **UNIT III - Clinical Chemistry**

Clinical chemistry: Composition of blood – blood grouping - determination of blood groups and matching – blood pressure – hyper tension – determination.

Determination of glucose in serum – Folin method, Wu's method determination of serum cholesterol – Sackett's method – tests for cholesterol.

Estimation of glucose in urine – Benedict's test – tests for salts in serum – tests for chlorides in serum – tests for salts in urine – tests for cholesterol in urine.

Detection of diabetes and anaemia. Estimation of hemoglobin (Hb concentration) – estimation of red blood cells(count).

Analysis of blood – determination of blood urea – urease method.

Estimation of bile pigment in serum – estimation of total protein in serum – estimation of total proteins and albumin based on Biuret and BCG methods.

#### **UNIT IV- Diseases and treatment I**

Causes and treatment of some common diseases:

Insect borne diseases – malaria and filariasis.

Air borne diseases – diphtheria, whooping cough, influenza, cold, fever and tuberculosis.

Water borne – cholera, typhoid and dysentery.

Digestive disorders – jaundice – respiratory disorder – asthma – nervous disorder –epilepsy - other diseases – piles and leprosy.

Functions, uses and effects of the following drugs:

Cardiovascular drugs – antiarrhythmic drugs - quinidine.

Anti-hypertensive drugs - reserpine.

Anti-anginal drugs - glyceryl trinitrate and isosorbide dinitrate.

Sulpha drugs – sulphanilide and sulphadiazine.

#### UNIT V - Diseases and treatment II

Cancer – causes, spread and treatment – structure and effects of chloram-Bucil (Leukeran), methotrexate (Anti-metabolite), plant products and hormones.

Diabetes – control – structure and uses of insulin - Oral hypoglycemic drugs – tolbutamide and chloropropanamide.

Anti-convulsant agents – structure and uses of barbiturates and succinimides.

Uses and effects of the following drugs:

Analgesics – narcotic analgesics – action, uses and structural activity of morphine. Non-narcotic analgesics – asprin and paracetamol. Anesthetic – general anesthetic – uses and disadvantages of vinlyl ether and halothane. Intravenous anesthetics – tripental sodium – local anesthetics – cocaine and cinchocaine. Anti-psychotic drugs – piperazine and benzamides.

Anti-anxiety drugs – benzodiazepine.

#### **REFERENCE BOOKS:**

- 1. Chatwal G. R., *Medicinal Chemistry*, , Himalaya Publishing House, New Delhi, 2002.
- 2. Gosh J., *Text Book of Pharmaceutical Chemistry*, S.Chand and Company, New Dehi, 2003.
- 3. Krupadanam G.L.D, Prasad D.V., Rao K.V., Reddy K.L.N. and Sudhakar C., *Drugs*, Orient Longmann Pvt. Limited, Hyderabad, 2005.
- 4. KhandpurR. S., *Handbook of Biomedical Instrumentation*, II Edition, Tata McGraw Hill Publishing, Company, New Delhi.

5. Plummer D., *Practical Biochemistry*, Tata McGraw-Hills Publishing Company, 2005.

## **Course Outcomes**

СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Describe the classification and the metabolism of drugs, causes and treatment for some diseases	1,5	Understanding
CO-2	Explain thechemical pathways of drug metabolism, instrumentation and principle of medical instruments	1,3,5	Understanding
CO-3	Estimate the clinical composition of blood and urine	1,3,5	Applying
CO-4	Infer the results of ECG and the clinical test on blood and urine,	1,3,5	Analyzing
CO-5	Determine the causes and treatment for some non-communicable diseases.	1,3,5	Evaluating

Semester	Co	Course Code Title of the Course		1	Hours		Cre	Credits			
V	<b>21UECH52B</b> MEDICINAL CHEMISTRY			'RY		60		4			
Course	Course Programme Learning Prog			Prog	ram	ime Sj	pecifi	2			
Outcomes		Oute	come	s (PLOs)			Out	coı	mes (P	SOs)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSC	)2	PSO3	PSO4	PSO5
CO-1	✓				✓	✓					✓
CO-2	✓		✓		✓	✓			✓		✓
CO-3	✓		✓		✓	✓			✓		✓
CO-4	✓		✓		✓	<ul> <li>✓</li> </ul>			✓		✓
CO-5	✓		✓		✓	<ul> <li>✓</li> </ul>			✓		✓
		Number of matches ( $\checkmark$ ) = 28									
		Relationship = Medium									

#### SEMESTER - V

Course Title	COMPUTERS IN CHEMISTRY WITH C <sup>++</sup>
Total Hrs.	60
Hrs./Week	4
Course Code	21UECH52C
Course Type	DSC-II-C
Credits	4
Marks	100

#### **General Objectives:**

This course emphasises on the basic concepts of C++, tokens, data types, class, functions, operator overloading and the programs in chemistry with C++.

#### **Course Objectives:**

СО	The learner will be able to :
CO-1	Explain the basic concepts of C++
CO-2	Discuss the tokens and data types of C++
CO-3	Analyze class and function of C++
CO-4	Explain operator overloading of C++
CO-5	Solve various problems in chemistry based on C++ program

#### UNIT I – Basic concepts of C++

Basic concepts of object oriented programming in  $C^{++}$  - Benefits of OOPS – Object oriented programming languages. Applications of OOPS – Applications of  $C^{++}$  - A simple program in  $C^{++}$  - Structure of  $C^{++}$  program.

#### UNIT II - Tokens and Basic data types of C++

Tokens – keywords – identifiers – Basic data types – User Defined data types – Derived data types, identifiers and constants– symbolic constants – Type compatibility – Variables – Declaration of variables – Reference variables – Operators in C<sup>++</sup> - Type cast operators – Manipulators – Expression and their types– operator overloading – operator precedence .

#### UNIT III – Class and function of C++

Specifying a class – Defining member function  $-C^{++}$  program with a class – Making an outside function inline – Nesting of member functions – Private member functions – Arrays with in a class – Memory allocation for objects – Static data members – static member function – Arrays of object – Object as function Arguments.

#### **UNIT IV – Operator Overloading**

Defining operator overloading – overloading unary and binary operators – overloading binary operators using friends – Manipulation of strings using operators – Rules for Overloading – Type conversions. Single inheritance – Making a private member an inheritable – Multilevel inheritance – Multiple hybrid inheritance – Virtual Base, virtual function.

#### UNIT V – C<sup>++</sup> programming

Programming examples from chemistry – Algorithms – flow chart– Determination of root mean square (RMS), average and most probable velocities of gases – Calculation of  $\Delta E$ ,  $\Delta W$  and  $\Delta H$  for adiabatic expansion of a monoatomic ideal gas – Determination of normality, molarity, molality of solution – Calculation of pH and ionic strength of solution, half-life period & average life period of radioactive nuclei.

#### **REFERENCE BOOKS:**

- 1. Balaguruswamy.E. *Object oriented programming with C++*: Tata McGraw Hill Publishing Company Ltd., New Delhi: 2008.
- 2. Pandey.H.M. Trouble Free C++: Ane Books Pvt. Ltd., New Delhi: 2010.
- 3. Raman K.V.*Computer in Chemistry*: Tata McGraw Hill Publishing Company Ltd., New Delhi: 2003.
- 4. Ramesh Kumari. *Computers and their Application to Chemistry:* Narosa Publishing House, New Delhi: 2007.
- 5. Ravichandran.D. *Programming with C++*:Tata McGraw Hill Publishing Company Ltd., New Delhi: 2008.

## **Course Outcomes**

СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Understand the structure of C++	1,2,3,5	Understanding
	programming		
CO-2	Construct the keywords in C++	1,3,5	Applying
	programme		
CO-3	Distinguish various functions in the	1,3,5	Analysing
	C++ programme		
CO-4	Compare overloading with unary and	1,3,5	Evaluating
	binary operators		
CO-5	Formulate C++ programme for the	1,2,3,5	Creating
	various Physical Chemistry Experiments		

Semester	Cou	rse Co	de	Title of the Course				Hours	Cr	Credits	
v	21U	ECH52	2C	CO	OMPUTERS IN			60		4	
			0	CHEMI	STRY	WITH C	C++				
Course	F	rograr	nme L	earnir/	ıg	1	Programme Specific				
Outcomes		Outco	omes	(PLOs)			Outc	omes (	PSOs)		
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO	
	1	2	3	4	5	1	2	3	4	5	
CO-1	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	
CO-2	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	
CO-3	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	
CO-4	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	
CO-5	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	
		Number of matches ( $\checkmark$ ) = 31									
				Rela	ationsh	ip = Me	dium				

<b>Course Title</b>	COORDINATION CHEMISTRY
Total Hrs.	60
Hrs./Week	4
Course Code	21UCCH61
Course Type	DSC-X
Credits	4
Marks	100

#### **SEMESTER – VI**

#### **General Objective:**

To obtain knowledge coordination chemistry, to study the metal carbonyls

and to gain the knowledge of bioinorganic chemistry

#### **Course Objectives**:

CO No.	The learners will be able to :							
$CO_{-1}$	Understand the basic concepts, theories, mechanism and							
00-1	application of Coordination chemistry							
CO-2	Discuss the modern theories of coordination compounds							
CO-3	Outline the nature and properties of metal carbonyls							
CO-4	Distinguish the spectral properties of d <sup>1</sup> to d <sup>9</sup> systems							
CO-5	Evaluate the role of metal ions in biological system							

#### **UNIT I - Basic concepts in Coordination Chemistry**

Basic concept – Difference between double salt and complexes-Terminology: Oxidation number and Coordination number - Types of ligands (Monodentate, Bidentate, Polydentate and bridging ligands). Calculation of Oxidation number in complexes.

IUPAC nomenclature of coordination compounds. Structural Isomerism and Stereo isomerism in square planar, octahedral and tetrahedral complexes. Werner's coordination Theory - VB theory -Applications of VB theory to tetrahedral, square planar and octahedral complexes – Merits and Limitations.

#### UNIT II - Coordination Chemistry I

Crystal Field Theory - crystal field splitting of tetrahedral, square planar and octahedral systems - Factors affecting the value of  $\Delta$ . Crystal field splitting energy (CFSE) values and its application in the stability of complexes - calculation of CFSE for metal ions d<sup>1</sup> to d<sup>9</sup> systems.

Application of crystal field theory in spectral and magnetic properties - Distortion from perfect symmetry - Jahn - Tellar effect. Molecular orbital approach - MO diagrams for  $ML_6$  type complexes -  $\pi$  - back bond coordination – Weak and strong field ligands - Spectrochemical series and its applications.

#### **UNIT III - Coordination Chemistry II**

Metal carbonyls - classifications – bonding and structure of metal carbonyls – EAN rule – VB and MO theory,  $M \rightarrow CO$  bonding.- preparation and structure of Ni(CO)<sub>4</sub>, Fe(CO)<sub>5</sub>, Mn<sub>2</sub>(CO)<sub>10</sub> and Fe<sub>2</sub>(CO)<sub>9</sub>.

Stability of Complexes in Solutions - stepwise stability constants and overall stability constant - log  $\beta$  value and stability. Factors affecting the stability of complexes in solution - Determination of stability constant by Bjerrum method.

Chelate - chelate effect - explanation of chelate effect - Kinetic stability - labile and inert complexes - Trans effect.

#### **UNIT IV - Spectral Properties of Complexes**

Electronic spectra of complexes – LS coupling - micro state – Hund's rule – Term symbols – selection rules for electronic transition.

General energy diagrams of  $d^1$  and  $d^9$ ,  $d^4$  and  $d^6$ ,  $d^2$  and  $d^8$ ,  $d^3$  and  $d^7$  (Orgel diagram) - Charge transfer spectra (elementary idea).

#### UNIT V - Bio - inorganic Chemistry

Essential elements in biological systems - bulk, [C, N, P, S, Na, Ca, Mg], trace [Fe, Zn, Cu, Mo] and ultra - trace [As, Ni, Cd, Pb] – Deficiency disorders and toxic effect of metals in medicine – Diagnosis and treatment – Metallo biomolecules - Metallo proteins – Metallo enzyme - classification - Structure and functions of - hemoglobin, myoglobin, Chlorophyll, Vitamin  $B_{12}$ , Na<sup>+</sup> / K<sup>+</sup> pump.

#### **REFERENCE BOOKS :**

- 1. Cottan, F.A. Advanced Inorganic Chemistry. Wiley. 6thEdu. 1996
- 2. Gopalan, R. et.al. *Concise of Coordination Chemistry*. Vikas Publishing House, 2007
- 3. Huhee, J. Inorganic Chemistry, pearson publication, 2012.
- 4. Lee, J.D. New Concise Inorganic Chemistry. ELBS 5th Ed.2002.
- 5. Madan, R.L., et.al. *Inorganic Chemistry*. S. Chand Co., Ltd. New Delhi. 2003
- 6. Malik, U. Et.al. Selected Topics in Inorganic Chemistry. S.Chand.
- 7. Puri, B.R. et.al. *Principles of Inorganic Chemistry*. Milestone publishers, New Delhi, 2007.
- 8. Sathya Prakash, G.D. et.al. Advanced Inorganic Chemistry. S. chand

CO No.	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level								
CO-1	Explain the fundamental concepts in coordination chemistry	1,3,5	Understanding								
CO-2	Infer the bonding and structure of metal carbonyls	1,3,4,5	Understanding								
CO-3	Illustrate the stability of metal complexes by spectral and Bjerrum methods	1,3,4,5	Applying								
CO-4	Examine the spectral properties of Inorganic complexes	1,3,4,5	Analyzing								
CO-5	Assess the importance of metal ion in biological system.	1,3,5	Evaluating								

## **COURSE OUTCOMES**

## **RELATIONSHIP MATRIX**

Semester	Course Code			emester Course		le	Title Cou	of the urse		Hours		Credits	
VI	211	JCCH6	1	Coordination			60		4				
				Chen	nistry	_							
Course		Progran	nme I	Learning	g		Progra	mme	Specifi	2			
Outcomes		Outco	omes	(PLOs)			Outc	omes	(PSOs)				
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5			
CO-1	✓	✓	✓	✓		<ul> <li>✓</li> </ul>		✓		✓			
CO-2	✓	✓	✓	✓		✓		✓	✓	✓			
CO-3	✓	✓	✓	✓		✓		✓	✓	✓			
CO-4	✓	<ul><li>✓</li></ul>	✓	<ul><li>✓</li></ul>		✓		✓	✓	✓			
CO-5	$\checkmark \qquad \checkmark \qquad \checkmark \qquad \checkmark$			✓		✓		✓		✓			
	Number of matches ( $\checkmark$ ) = <b>38</b> (High)												
				Rela	ationsh	ip = H	igh						

#### SEMESTER – VI

Course Title	PHYSICAL CHEMISTRY –III
Total Hrs.	60
Hrs./Week	4
Course Code	21UCCH62
Course Type	DSC-XI
Credits	4
Marks	100

#### **General Objective:**

The course focuses on advanced topics in Physical Chemistry such as photo chemistry, electrochemistry and group theory.

#### **Course Objectives:**

СО	The learners will be able to :								
CO-1	Explain the various laws pertaining to the photochem								
	reactions								
CO-2	Discuss the concept of Transport number of ions								
CO-3	Illustrate the various reversible cells								
CO 4	Correlate the concept of electrical and magnetic properties of								
molecules									
CO-5	Estimate the concept of group theory								

#### **UNIT I - Photochemistry**

Comparison between photochemical and thermal reaction - Beer -Lambert's law - Limitations - Laws of photochemistry - Grothus Draper law -Stark - Einstein law - Primary and secondary processes - Quantum yield high and low quantum yield - experimental determination of quantum yield - chemical actinometer.

Consequences of light absorption - Jablonski diagram - fluorescence and phosphorescence - photochemical reaction - photochemical rate law -Kinetics of HBr formation

Energy transfer in photochemical reactions - Photosensitization and quenching - chemiluminescence - bioluminescence.Fast reaction - Flash photolysis, pulse radiolysis

#### UNIT II - Electrochemistry I

Conductance: Specific, molar and equivalent conductances -Measurement of equivalent conductance – Debye Huckel Theory of strong electrolyte - Significance of Debye Huckel Onsager equation (derivation not required) -- Variation of equivalent conductance and specific conductance with dilution - Kohlrausch's law and its application

Transport number - Abnormal Transport number - Determination of Transport number by Hittorf and Moving boundary method

Absolute velocities of an ionand its determination - Mobility of  $H^{\scriptscriptstyle +}$  and OH- ion - Application of conductivity measurement - Determination of Degree of dissociation - Determination of  $K_a$ 

Solubility product - relationship between solubility and solubility product - Applications of solubility product and common ion effect in inorganic qualitative analysis - Solubility and solubility product of sparingly soluble salts – applications of solubility product principle

Various types and applications of Conductometric titration: Acid/base and Precipitation titration

#### **UNIT III - Electrochemistry II**

EMF - Electrochemical series and its significance

Nernst equation - Derivation of cell emf and single electrode potential -Concentration cells with and without transference: Electrode concentration cells-Electrolyte concentration cell - Reference electrodes: Standard Hydrogen Electrode, Saturated Calomel Electrode

Types of Reversible cells: metal - metal ion, gas - ion, metal - sparingly soluble salt and redox electrodes - cell representations and reactions

Liquid junction potential and its elimination - determination of pH using quinhydrone, hydrogen, Glass electrodes - potentiometric titrations: acid - base, Redox and precipitation titrations.

Thermodynamics of reversible/irreversible cells, Calculation of  $\Delta H$ ,  $\Delta G$ ,  $\Delta S$  and equilibrium constant of cell reaction

#### UNIT IV - Electrical and Magnetic Properties

Dipole moment, Electrical polarization, Polarization of molecules and their measurements - dielectric polarization, dielectric constant

Clausius-Mossotti equation, Debye and Laurentz equation

Determination of dielectric constant - Methods of determination of dipole moment - Applications in the structural elucidation of Molecules Magnetic Properties: Permeability - Susceptibility - dia, para, ferro and superparamagnetism

Measurement of magnetic susceptibility by Gouy balance. Determination of magnetic moment of paramagnetic substance and number of lone pair of electronsand its Application for odd electron molecules, Free radicals and ion.

#### UNIT V - Group Theory

Group theory - symmetry elements and symmetry operations.

Symmetry operations generated by these symmetry elements using examples like  $H_2O$ ,  $NH_3$ ,  $BF_3$ ,  $PtCl_{4^2}$  - ,  $H_2O_2$  (planar, *cis* and *trans*) and  $CH_4$ .

Condition for a set of elements to form a group - Abelian and cyclic groups - Group multiplication table - Molecular point groups - assignment of point groups to simple molecule like  $H_2O$  and  $NH_3$ 

#### **REFERENCE BOOKS :**

- 1. Puri, Sharma, Pathania, *Principles of Physical Chemistry*, 46<sup>th</sup> edition; Vishal Publishers:New Delhi, 2012.
- 2. Arun Bahl, BahlB.S., TuliG.D., *Essentials of Physical Chemistry*,28<sup>th</sup> Edition; S. Chand& Company Ltd: New Delhi, 2020.
- 3. Anthony R. West, Solid State Chemistry and its Applications, 2<sup>nd</sup> Edition; John Wiley & Sons: New Delhi, 2014.

- 4. Atkins, Paula, James *Physical Chemistry*, 11<sup>th</sup> Edition; Oxford University press: United Kingdom, 2018.
- 5. BhattacharyaP.K., Group Theory and its Chemical Applications, Himalayan Publishers: New Delhi 2014.
- 6. ChakrabartyD. K., *Solid State Chemistry*, II Edition; New Age International: New Delhi 2010.

CO	Upon completion of the course,	PSOs	Cognitive
	the students will be able to :	Addressed	Level
CO-1	Describe the various laws pertaining to the photochemical reactions	1,3,5,	Understanding
CO-2	Explore the concept of Transport number of ions	1,3,5,	Understanding
CO-3	Distinguish the various reversible cells	1,3,5,	Analyzing
CO-4	Determine theelectrical and magnetic properties of molecules	1,3,5,	Evaluating
CO-5	Anticipatethe molecules to form group	1,3,5,	Creating

## **Course Outcomes**

Semester	Course Code			Title of the Course			Hours		Credits	
VI	21UCCH62 Physical					60		4		
			0	Chemis	try - Il	I				
Course	Р	rogran	nme I	earnin	ıg		Progran	nme S	pecifi	C
Outcomes		Outco	omes	(PLOs)			Outco	mes (l	PSOs)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓	✓	✓	✓		✓		<ul> <li>✓</li> </ul>		✓
CO-2	✓	✓	✓	√		✓		<ul> <li>✓</li> </ul>		✓
CO-3	✓		✓	✓		✓		<ul> <li>✓</li> </ul>		✓
CO-4	✓		✓	✓		✓	✓	✓		✓
CO-5	✓		✓	✓		<ul> <li>✓</li> </ul>	✓	✓		✓
	Number of matches ( $\checkmark$ ) = 34									
				Rel	ationsh	nip = F	ligh			

#### SEMESTER – VI

<b>Course Title</b>	ORGANIC CHEMISTRY – III
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UCCH63
<b>Course Type</b>	DSC-XII
Credits	4
Marks	100

#### **General Objectives:**

This course elaborates on reaction mechanism of rearrangement reactions, preparation, properties and structure of heterocyclic compounds, alkaloids, terpenoids and natural pigments

#### **Course Objectives**:

СО	The learners will be able to :								
$CO_1$	Outline the plausible mechanism for different rearrangement								
00-1	reactions.								
CO-2	Infer heterocyclic compounds and their properties.								
$co^{2}$	Ascertain the properties of different heterocyclic compounds with								
CO-3	other organic compounds.								
CO-4	Assess the heterocyclic compound with more than one heteroatom								
CO-5	Investigate the alkaloids.								

#### UNIT I - Rearrangement

Rearrangement reactions: Classification, Migratory aptitude - Mechanism and uses of the following rearrangement reactions.

Electrophilic Rearrangements: Pinacol – Pinacolone, Wagner-Meerwein, Benzil-Benzilic acid rearrangements.

Nucleophilic Rearrangements: Beckmann, Hofmann, Curtius, Schmidt Fries (Inter, Intra and Photo) and Favorskii rearrangements. Sigmatropic Rearrangements: Claisen rearrangement.

# UNIT II - Heterocyclic compounds - I

Heterocyclic compounds: nomenclature- Five membered heterocycles containing one hetero atom- preparation and properties of furan, pyrrole and thiophene. Comparison of pyrrole with phenol - Comparison of pyrrole with aromatic amines - Comparison of aromatic character and basic nature of furan, pyrrole and thiophene.

Condensed Five membered heterocycles- preparation and properties of Indole and Isatin.

#### UNIT III - Heterocyclic compounds - II

Six-membered heterocycles containing one heteroatom- Pyridine-Preparation by Hantzsch synthesis-properties - Comparison of basic characters of Pyridine versus pyrrole, pyridine with aliphatic and aromatic amines

Condensed Heterocyclic compounds containing one heteroatom-Quinoline- Skraup synthesis, Friedlander's synthesis - properties -Isoquinoline - Bischler-Napieralski synthesis, Pomeranz-Fritsch synthesis properties – heterocycles containing more than one hetero atom- Purines and Pyrimidine – Synthesis and properties.

#### **UNIT IV - Alkaloids**

Alkaloids: Occurrence, Classification and General Methods of extraction - Hofmann exhaustive methylation (with coniine as example). Structural elucidation and synthesis of Coniine, Piperine and Nicotine.

#### UNIT V - Terpenoids and Natural pigments

Terpenes: Occurrence, Classification, Isoprene rule, General and Spectroscopic properties - Structural elucidation and synthesis of Citral and Camphor.

Carotenoids - isolation and general properties - synthesis of  $\beta$  -carotene.

Flavones, isolation and general properties - structural elucidation and synthesis of Quercetin.

Anthocyanins - isolation, structure (elucidation not required).

#### **REFERENCE BOOKS:**

- 1. Agarwal O. P., *Organic Chemistry: Natural Products Volume I*, Goel Publishing House, New Delhi, 2004.
- 2. Bansal R. K., *Heterocyclic Chemistry*, 5th Edition, New Age International Publishers, New Delhi, 2010.
- 3. Carey F. A., Sundberg R. J., Advanced Organic Chemistry, Part A: Structure and Mechanisms, Springer Science, New York, USA, 2007, e-ISBN-13: 978-0-387-44899-3
- 4. Carey F. A., Sundberg R. J., Advanced Organic Chemistry, Part B: Reactions and Synthesis, Springer Science, New York, USA, 2007, e-ISBN-13: 978-0-387-44899-3
- 5. Carruthers, W. and Coldham, I., *Modern Methods of Organic Synthesis*, Fourth Edition, Cambridge University Press, 2004.
- 6. Desai K.R., Organic Name Reactions, Oxford Book Company, 2008, ISBN: 978-81-89473-29-7
- Kürti L. and Czakó B., Strategic Applications of Named Reactions in Organic Synthesis, Elsevier Academic Press, 2005, ISBN: 0-12-429785-4.
- 8. Jack Li J., Name Reactions A Collection of Detailed Reaction Mechanisms, 3rd. expanded ed, Springer Berlin Heidelberg New York, 2006, ISBN-10 3-540-30030-9.
- 9. Jain M.K. and Sharma S.C., *Modern Organic Chemistry- Vishal Publishing Co.*, Jalandhar, 2017 ISBN: 978-81-932934-9-2.
- Sujata, V. B., Nagasampagi B.A., Meenakshi S., Chemistry of Natural Products, Narosa Publishing House, 2005, ISBN-9783540406693
- 11. Finar, I. L., Organic Chemistry Vol. I and II, (Sixth ed,) Addison Wesley Longman Ltd., England, 1996.

12. Wade Jr., L. G., Organic Chemistry, Eighth Edition, Pearson Education, Inc. USA, 2013, ISBN 978-0-321-76841-4 (0-321-76841-8).

#### **Course Outcomes**

CO	Upon completion of the course, the	PSOs	Cognitive
	students will be able to :	Addressed	Level
CO-1	Recognize a migratory functional	1,5	Knowing
	group, heterocyclic compounds, an		
	alkaloid, terpenoid and natural		
	pigments.		
CO-2	Explain the synthesis of condensed	1,3,5	Understanding
	heterocyclic compounds, alkaloids,		
	terpenoids and natural pigments		
CO-3	Classify the different rearrangement	1,3,5	Applying
	reactions on the basis of mechanism		
	and heterocyclic compounds, alkaloids		
	and terpenoids on structural aspects		
CO-4	Compare the various organic	1,3,5	Analyzing
	rearrangement reactions, properties		
	heterocyclic compounds and other		
	natural products.		
CO-5	Construct a methodology to arrive at	1,3,5	Evaluating
	the structure of alkaloids, terpenoids		
	andnatural pigments		

Semester	ester Course Code Title of the Course			;	Hours	s Cr	Credits			
VI	21U	CCH63	OR	<b>ORGANIC CHEMISTRY</b> -				60		4
					III					
Course	]	Program	nme Le	earning	g	] ]	Progra	amme S	Specifi	С
Outcomes		Outco	mes (l	PLOs)			Oute	comes (	PSOs)	
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓		✓		✓	✓				✓
CO-2	✓		✓		✓	✓		✓		✓
CO-3	✓		✓		✓	✓		<ul> <li>✓</li> </ul>		✓
CO-4	✓		✓		✓	✓		✓		✓
CO-5	✓		~		✓	✓		<ul> <li>✓</li> </ul>		✓
	Number of matches $(\checkmark) = 29$									
				Relati	onship	= Med	dium			

#### SEMESTER – VI

Course Title	ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UCCH6P1
Course Type	PRACTICAL-VII
Credits	2
Marks	100/2

#### General Objective:

This course focuses on the analysis of organic compounds and to prepare different organic compounds following the procedure based on name reactions.

#### **Course Objectives:**

CO	The learners will be able to :									
CO-1	Differentiate mono and bifunctional organic compounds qualitatively									
CO-2	Classify the saturated and unsaturated organic compounds.									
CO-3	Identify the functional groups present in different organic compounds									
CO-4	Develop the synthesis of derivative compounds for their respective functional compounds									
CO-5	Synthesize organic compounds by some rearrangement reactions									

# I. Qualitative analysis of the organic compound (may contain one or two functional groups):

- a. Test for aliphatic or aromatic nature of substance
- b. Test for saturation or unsaturation
- c. Test for elements (N, S and halogens)
- d. Identification of functional groups (carboxylic acid, phenol, Aldehyde, ketones, esters, carbohydrate, Primary amines, Amides,Nitro compounds and Anilides)
- e. Preparation of rational solid derivative to confirm the presence of any one of the functional groups.

#### II. Preparation of organic compounds:

- 1. Preparation of banzamide from Benzoic acid (Scotten Bauman reaction)
- 2. Preparation of Amine from cyclohexanone (Beckman rearrangement)
- 3. Preparation of Benzilic acid from Benzil (Benzil-Benzilic acid rearrangement)
- 4. Preparation of Biphenyl from cyclohexane (Wurtz reaction)
- 5. Preparation of Benzoic acid from Benzaldehyde (Cannizaro reaction)
- 6. Preparation of benzophenacolone from benzophenacole (Pinacol Pinacolone Rearrangement) (Course work)

### **REFERENCE BOOKS :**

- 1. Ahluwalia, et.al., V.K. *College Practical Chemistry*. Universities Press (India) Private Ltd., Hyderabad.2005
- 2. Ghoshal et.al. *Advanced Course in Practical Chemistry*. New Central Book Agency (P) Ltd., Kolkata 2000;
- 3. Monograph on Green Chemistry Laboratory experiments, Green Chemistry Task Force Committee, DST.
- 4. Mukhopadhyay, R., et.al. Advanced Practical Chemistry. Arunabha Sen, Books & Alied (P) Ltd., Kolkata. 2007
- 5. Vishnoi, N.K. Advanced Practical Chemistry. Vikas Publishing House, New Delhi. 2005
- 6. Vogel, AI. A textbook of practical organic chemistry. Pearson education, India.

#### **Course Outcomes**

CO	Upon completion of the course,	PSOs	Cognitive
	the students will be able to :	Addressed	Level
CO-1	Explain the principles of organic reactions mechanisms.	1,3,5	Understanding
CO-2	Investigate functional groups in organic compounds by chemical tests in the laboratory	1,2,3,4	Applying
CO-3	Illustrate practical techniques employed for systematic processes for the identification of unknown organic solid and liquid compound.	1,2,3,4	Analyzing
CO-4	Synthesize the given organic compounds into the respective derivatives	1,2,3,4	Evaluating
CO-5	Develop the synthesis of organic compounds from rearrangement reactions	1,3,4,5	Creating

Semester	ester Course Code Title of the Course			•	Hour	s Cı	Credits				
VI	21UC	1UCCH6P1 ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS				AND DS	60		2		
Course	] ]	Program	nme Lo	earnin	g	Programme Specific				C	
Outcomes		Outco	omes (I	PLOs)		Outcomes (PSOs)					
(COs)	(COs) PLO1 PLO2		PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	✓	✓	✓	✓		✓		✓		✓	
CO-2	✓	✓	✓	✓		✓	✓	✓	✓		
CO-3	✓	✓	✓	✓		✓	✓	<ul> <li>✓</li> </ul>	✓		
CO-4	✓	✓	✓	✓		✓	✓	✓	✓		
CO-5	<ul> <li>✓</li> <li>✓</li> </ul>		✓	✓		<ul> <li>✓</li> </ul>	✓	✓	✓	<ul> <li>✓</li> </ul>	
		Number of matches $(\checkmark) = 40$									
		Relationship = $High$									

#### SEMESTER – VI

Course Title	CHROMATOGRAPHIC SYNTHESIS	TECHNIQUES	AND	GREEN
Total Hrs.	60			
Hrs./Week	4			
Course Code	21UCCH6P2			
Course Type	PRACTICAL-VIII			
Credits	2			
Marks	100/2			

#### **General Objectives:**

This practical course focuses on training the students with chromatography techniques like paper and thin layer chromatography and to synthesize organic compounds by applying green chemistry procedure.

#### **Course Objectives**:

СО	The learners will be able to :		
CO-1	Classify the naturally occurring pigment and carbohydrates by		
	ascending paper chromatography.		
CO-2	Observe the mechanism of chromatographic separation.		
CO-3	Adapt the appropriate mobile phases based on the compounds to		
	be separated.		
CO-4	Figure out the $R_f$ value for a given compound by thin layer		
	chromatography.		
CO-5	Justify the importance of the atom economy and efficacy of an		
	organic reaction by adopting green procedures.		

## A. Chromatographic technique:

#### I Paper Chromatography:

- 1. Separation of pigments present in spinach leaves by ascending paper chromatography.
- 2. Separation of the monosaccharides and disaccharides [Glucose, Fructose, Sucrose] by ascending paper chromatography.
- 3. Separation and identification of amino acids by ascending paper chromatography

#### II Thin Layer Chromatography

- 1. Thin layer chromatography: Separation of organic mixture containing o -, m and p nitrophenol and the determination of R<sub>f</sub> values of the separated components in a mixture.
- 2. Separation and identification of Group II cations in a mixture  $[Cu^{2+}]$  and  $Cd^{2+}]$  using TLC and report the  $R_f$  value.
- 3. Separation and identification of Group IV cations in a mixture  $Co^{2+}$  and  $Ni^{2+}$  by TLC and report the  $R_f$  value
- 4. Separation and identification of Aspirin, Phenacetin and Caffeine by TLC and report the  $R_f$  value.

#### **B.** Green Synthesis of the following compounds

- 1. Acetylation of Primary Amine (Preparation of acetanilide)
- 2. Base Catalyzed Aldol Condensation (Synthesis of dibenzalpropanone)
- 3. Bromination of trans-stilbene
- 4. [4+2] Cycloaddition Reaction (Diels-Alder reaction between furan and maleic acid).
- 5. Rearrangement Reaction (Benzil- Benzilic acid rearrangement)
- 6. Electrophilic Aromatic Substitution Reaction (Nitration of phenol).

#### **REFERENCE BOOKS:**

- 1. Ahluwalia, V. K., Dhingra, S., Gulati, A., *College Practical Chemistry*, Universities Press, 2005, ISBN: 9788173715068.
- Bajpai, D. N., Pandey O. P. and Giri, S., *Practical Chemistry*, S Chand & Co Ltd, 2013, ISBN: 9788121908122.
- 3. Jeffery G. H., Bassett J., Mendham J., Denneya. R C., Vogel's Text book of Quantitative Chemical Analysis, Fifth Edition, Longman Scientific and Technical, UK, 1989
- 4. Mukhopadhyay, R., Chatterjee, P., Arunabha Sen R., Advanced Practical Chemistry, Books & Allied(P) Ltd., Kolkata, 2007.
- 5. Nad, A.K., Mahapatra, B., Ghoshal, A., *Advanced Course in Practical Chemistry*, New Central Book Agency (P) Ltd., Kolkata, 2000.
- 6. Vishnoi, N. K., *Advanced Practical Chemistry*, Vikas Publishing House, New Delhi, 2005.
# **Course Outcomes**

СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Associate the theory of chromatography in the separation of compounds by choosing suitable stationary and mobile phases.	1,2,4	Understanding
CO-2	Differentiate the ascending paper chromatography from thin layer chromatography	1,2,3,4	Understanding
CO-3	Calculate the retardation factor for a compound	1,2,4	Applying
CO-4	Analyze a given mixture and report the number of components present	1,2,3,4	Analyzing
CO-5	Synthesize different types of compound by green synthetic methods.	1,2,3,4,5	Creating

Semester Course Code			Title of the Course					cro	Credits		
VI	VI 21UCCH6P2		C TEC	CHROMATOGRAPHI TECHNIQUES AND GR SYNTHESIS			C EEN	60 N		2	
Course Outcome	Programme Le (P		earnin PLOs)	earning Outcomes PLOs)			Programme Specific Outcomes (PSOs)			8	
s (COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	✓	✓	✓	✓		<ul> <li>✓</li> </ul>	✓		✓		
CO-2	✓	✓	✓	✓		✓	✓	✓	✓		
CO-3	✓	✓	✓	✓		✓	✓		✓		
CO-4	✓	✓	✓	✓		✓	✓	✓	✓		
CO-5	✓	✓	✓	✓		✓	✓	✓	✓	✓	
	Number of matches ( $\checkmark$ ) = 39 Relationship = High										

#### SEMESTER – VI

Course Title	EMERGING TRENDS IN CHEMISTRY
Total Hrs.	60
Hrs./Week	4
Course Code	21UECH61A
Course Type	DSE-III-A
Credits	4
Marks	100

#### **General Objectives:**

This course emphasises on supramolecular compounds, green chemistry, nano chemistry, solid state chemistry, drug design and organic electrochemistry

#### **Course Objectives**:

СО	The learners will be able to :					
$CO_1$	Explain the concepts in supramolecular chemistry and green					
00-1	chemistry					
CO-2	Discuss the principle, synthesis and properties of nanomaterials					
CO-3	Explore the electrical, magnetic and optical properties of solids					
CO-4	Examine the procedures followed in drug design					
CO-5	Evaluate the electrochemical principles in electroplating and cells.					

#### UNIT I SUPRA MOLECULAR CHEMISTRY AND GREEN CHEMISTRY

Supramolecular chemistry – important concepts – crown ethers and cryptands – molecular recognition – principle of molecular receptor design – spherical recognition (cryptates of metal cations) and examples – tetrahedral recognition with examples – supramolecular characteristics – supramolecular reactions and catalysis – catalysis by cation receptor.

Principles of green chemistry – Green solvents – Green oxidation of alcohols.

#### UNIT II NANO CHEMISTRY

General principles of Nanotechnology – fundamental principles, nanoparticles – size relationship- Nanoparticles of metals, semiconductors and oxides. – synthesis of Nano sized compounds – Reduction methods, solgel method and chemical vapour deposition method – Properties – Optical and electrical – Nanoclusters – carbon nano tubes – Application of nanochemistry in various fields.

#### UNIT III SOLID STATE CHEMISTRY

Bonding in metal – Pauling's Valence bond method - Structure of fluorite, antifluorite, rutile, perovskite, spinel, inverse spinel.

Electrical properties – free electron theory, band theory- conductors, insulators and semiconductors.

Magnetic properties – Langevin equation – Hysteresis – Mossbauer spectroscopy (elementary idea only).

Optical properties – Dielectric properties – piezo electric and ferro electric crystals and its applications.

#### UNIT IV DRUG DESIGN

Drug design – development of drugs – procedures followed in drug design – lead components and modification – concept of pro drugs and soft drugs – Physical and chemical factors of drug design – chemical structure and pharmacological activities of drugs – General principles of drug action – absorption, distribution, metabolism and excretion – receptors, metabolites and anti metabolites.

Synthesis of the following drugs – Paracetamol (Analgesics) – Chloroamphenicol and Penicillin (Antibiotic) – Benadryl (Anti histamines) – Carbovir (anti AIDS) – chloroquine (anti malarial) – Diazepam (psychoactive and tranquilizer).

#### UNIT V APPLIED ELECTROCHEMISTRY

Organic electrochemistry – electrochemical oxidation – Kolbe's synthesis – Electro reduction of carbonyl compounds – adiponitrile synthesis – Electroplating – Principle, process – electroplating of Cu, Ni and Cd – Types of coating – protection of structure and pipelines – protection of ships in sea.

Power sources – Primary cells – principles, selection of anode and cathode – alkaline  $-MnO_2$  cells – secondary cells – characteristics – Li battery, Ni-Cd battery – Fuel cell – Principle - Hydrogen oxygen fuel cell, alkaline fuel cells.

#### **REFERENCE BOOKS:**

- 1. Jonathan W. Steed. *Supramolecular chemistry*, 2<sup>nd</sup> edition: Wiley Publishers: 2009.
- 2. Ahluwalia A.K. *New trends in Green chemistry*: Anamaya Publishers: New Delhi, 2004.
- 3. Guozhang Cao, Nanostructures and nanomaterials: Synthesis, properties and applications: Imperial College Press: London, 2004.
- 4. Antony R. West, *Solid state chemistry and its applications*: John Wiley & sons: New Delhi, 1989.
- 5. Gareth Thomas. *Fundamentals of Medicinal Chemistry*, John Wiley & sons: New Delhi, 2003.
- Viswanathan B., Sundaram S., Venkataraman R., Rengarajan K. and Raghavan P.S., Viswanathan S. *Electrochemistry - Principle and Applications*, 1<sup>st</sup> edition: Printers & Publishers Pvt.Ltd.: Chennai, 2000.

	Course Outcomes									
CO	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level							
CO-1	Describe the principles of green chemistry	1,4,5	Understanding							
CO-2	Discuss the synthesis and properties of nano materials	1,4,5	Understanding							
CO-3	Express the structure and properties of solids.	1,4,5	Applying							
CO-4	Analyze the principles and procedures of drug design	1,4,5	Analyzing							
CO-5	Explain the types of coating for the prevention of corrosion	1,4,5	Evaluating							

Semester	emester   Course Code		•	Title of the Course					rs Cr	edits
VI	21UE	CH61A	A E	MERG	ING T	REND	S IN	60		4
				Cl	HEMIS	TRY				
Course	I	Programme Learning Programme Specific								
Outcomes		Outco	omes (]	PLOs)			Outco	omes (	PSOs)	
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO
•••	1	2	3	4	5	1	2	3	4	5
CO-1	✓			✓	✓	<ul> <li>✓</li> </ul>			✓	✓
CO-2	✓			✓	✓	<ul> <li>✓</li> </ul>			1	✓
CO-3	✓			✓	✓	<ul><li>✓</li></ul>			✓	✓
CO-4	✓			✓	✓	<ul> <li>✓</li> </ul>			✓	✓
CO-5	✓			✓	✓	<ul> <li>✓</li> </ul>			✓	✓
			N	Number of matches ( $\checkmark$ ) = 30						
	Relationship = Medium									

#### **SEMESTER – VI**

<b>Course Title</b>	DAIRY CHEMISTRY
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UECH61B
<b>Course Type</b>	DSE-III-B
Credits	4
Marks	100

#### General Objectives:

This course describes the composition, properties, processing, lipids of milk and preparation of different milk products,

#### Course Objectives:

CO	The learners will be able to :
CO-1	Describe the composition and properties of milk.
CO-2	Demonstrate the processing of milk under different conditions.
CO-3	Classify the various milk products after processing.
CO-4	Investigate differentkinds of milk.
CO-5	Evaluate the nutrient values of milk andmilk products.

#### **UNIT I - COMPOSITION AND PROPERTIES OF MILK**

Milk – General properties – Chemical composition – Milk fat (taste, colour, acidity & pH, specific heat & gravity, electrical conductivity & freezing point) – Milk fat – Its properties like iodine number, RM number, Saponification number – Acid Degree Value Miner – Constituents of milk – Vitamins – factors affecting the composition of milk – Milk proteins – Its physical properties like electrical properties.

#### UNIT II - PROCESSING OF MILK

Destruction of microorganisms in milk – Physiochemical changes during processing – Boiling, Pasteurisation – types – bottle, batch, HTST (High Temperature Short Time), Vacuum, UHT (Ultra High Temperature) Pasteurisation.

#### UNIT III - MILK PRODUCTS – I

Special milks – Sterilized milk – advantages and disadvantages – Factors influencing homogenization – flow diagram of its manufacture – homogenizer – Soft curd – Milk – properties – method of its preparation – flavoured milks – flow diagram of its manufacture - sterilized flavoured milk – flow diagram of its manufacture – vitaminized/irradiated milk, frozen/concentrated milk – fermented milk – cultured buttermilk – flow diagram of its manufacture – acidophilus milk – flow diagram of its manufacture – Yogurt – flow diagram of its manufacture.

#### **UNIT IV - MILK PRODUCTS - II**

Standardized Milk – Merits reconstituted/rehydrated milk – flow diagram of its manufacture – Recombined milk – merits, fallow diagram of its manufacture – Toned milk – flow diagram of its manufacture – Double toned milk – filled milk, Imitation milk, vegetable toned milk – soya milk cream – classification – manufacturing – Physiochemical properties – separation of cream, ghee – its composition.

Chemical analysis – isolation of casein from milk – estimation of lactose on milk – estimation of protein in milk – Determination of pH – Determination of specific gravity of milk, total solids in milk.

#### UNIT V - MILK LIPIDS

Milk lipids (or) esters (or) Oils (or) fats – compound lipids (Oils + fats) – structure of lecithin – derived lipids - churning operation – preparation of churn – filling cream into the churn – addition of colour – churning difficulties – refractive index – antioxidants – milk carbohydrates – its uses, properties – milk enzymes – condensed milk – its classification – differences between condensed milk & skim – condensed milk – nutritive value of milk – differences between human milk and Cow's milk.

#### **REFERENCE BOOKS**

- 1. Johnson, W. and Alford, *Fundamentals of Dairy Chemistry*, C.B.S. Publishers and Distributers Delhi, 2005.
- 2. Rangappa, K.S. and Achaya, K.T. *Indian Dairy products*, Asia Publishing House, Bombay, 1974.
- 3. Srinivasan, M. R. and Anantakrishnan, C.P.: *Milk Products of India, ICAR Animal Husbandry Series No. 4*, New Delhi, 1957.
- 4. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell V.W., *Harper's Biochemistry*, 21<sup>st</sup>Edn., McGraw-Hill, 1990.
- 5. Sukumar De., *Outlines of Dairy Technology*, 1<sup>st</sup> Edition., Oxford University Press, 1991.
- 6. Webb, B.H. and Whittier, E.O., *By-products from Milks*, the A.V.I. Publ. Co. Inc., Westport, Connecticut, 1970.

Course Ou	utcomes
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СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Explain the composition, properties, lipids of milk and processing of milk.	1,3,5	Understanding
CO-2	Discuss the manufacture of different forms of milk and its products	1, 3,5	Understanding
CO-3	Illustrate the flow diagram for the manufacture of the various kinds of milk.	1, 5	Applying
CO-4	Analyze the nutrient values of milk andmilk products.	1, 3, 5	Analyzing
CO-5	Determine the amount of lactose, protein, pH and specific gravity of milk	1, 3, 5	Evaluating

Semester	r Course Code			Title of the Course			H	Hours		Credits	
Course Outcomes	2101	Program Outco	nme Le omes (l	me Learning mes (PLOs)			Programme Specific Outcomes (PSOs)				
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	✓				✓	✓		✓		✓	
CO-2	✓	✓		✓	✓	✓		✓		✓	
CO-3	✓			✓	✓	✓				✓	
CO-4	✓	✓		✓	✓	✓		✓		✓	
CO-5	✓	✓		✓	✓	<ul> <li>✓</li> </ul>		✓		✓	
		Number of matches (✓) = 31 Relationship = <del>Low</del> /Medium/ <del>High</del>									

#### SEMESTER – V

<b>Course Title</b>	ENVIRONMENTAL CHEMISTRY
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UECH61C
<b>Course Type</b>	DSE-IIIC
Credits	4
Marks	100

#### General Objectives:

The objective of the course is to acquaint the students about the composition of different matrices of the environment and various environmental pollutions.

#### Course Objectives:

CO	The learner will be able to								
CO-1	Infer the basics of environmental chemistry								
CO-2	Illustrate the details of source, types and impacts of air pollution								
CO-3	Outline different types of water pollution and its consequences								
CO-4	Perceive knowledge of soil pollution								
CO-5	Elaborate Radioactive, Thermal and Noise pollutions								

#### Unit I:Fundamentals and Components of the Environment

Environmental segments – Atmosphere, Hydrosphere, Lithosphere and Biosphere – The nature cycles-Hydrological, Carbon, Oxygen,Nitrogen,Sulphur, Phosphorous and Biogeochemicalcycles- features, active and passive pools - perturbation by manmade activities.

#### Unit II: Air Pollution

Air pollutants - Primary and secondary – Gases, small particulates, hydrocarbons – Cyclone separators, Fabric filters, Electrostatic precipitators, Wet scrubbers – Photochemical smog – Acid rain –Chemistry of greenhouse effect – Global warming – Ozone layer depletion – Propellants-Green propellants Unleaded petrol – Bhopal gas tragedy – Chernobyl disaster – Air quality standards [NAAQS and NEERI].

#### **Unit III: Water Pollution**

The aquatic environment - types of water pollutants – organic pollutants – Inorganic pollutants – Eutrophication and its effects - Chemical and Physical treatment of industrial effluents and the methods of disposal-Heavy metal contamination and their biochemical effects– Determination of DO, BOD, COD and their significance – Total dissolved solids – Determinationof fluorideand Removal from polluted water – Water quality parameters and standards[WHO, BIS and ICMR].

#### **Unit IV: Soil Pollution**

Composition of lithosphere – Soil water and Soil air – Sources of soil pollution – Solid waste, Sources of biodegradable, non-biodegradable wastes– general characteristics - Industrial waste, Urban waste, Agricultural waste, biomedical wasteand their detrimental effects. Environmental hazards from fertilizers- Bio-fertilizers – Solid waste management - control rules - Disposal of solid waste (open dumping, sanitary landfill, incineration, composting)-Recycling and potential methods of disposal [glass, paper, metals and plastics].

#### Unit V: Radioactive, Thermal and Noise pollution

Radioactive pollution - Types and sources of Radioactivity - Natural and man-made radioactivity -Radioactive pollution - Fukushima Nuclear reactor accident- a case study - Precautions and control measures.

Thermal pollution- Sources, Impacts of thermal pollution on aquatic fauna and flora- Control measures

Noise Pollution- Sources of noise pollution-measurement-noise levelspermissible noise levels (Indoor and outdoor)- Physiological and Psychological effects – control devices mufflers, silencers, ear muffs, ear plugs.

#### **REFERENCE BOOKS:**

- 1. Environmental chemistry with green chemistry, Asim K. Das, Books and Allied Pvt Ltd, 2010.
- 2. Environmental chemistry, A. K. De, 5<sup>th</sup> edition, New Age International, 2004.
- Environmental chemistry, Peter O' Neill, 3<sup>rd</sup> edition, Blackie Academic & Professional, 1998.
- 4. Textbook of Environmental chemistry. V. Subramanian. Wiley india Ltd. 2020.
- 5. Fundamentals concept of Environmental chemistry. G.S. Sodhi. Narosa publishers.2020.
- 6. Industrial Chemistry, B.K. Sharma, Krishna Prakashan Media P. Ltd., Meerut, 2016.
- 7. Environmental Science and Biotechnology, Theory and Techniques, A.G. Murugesan, C. Rajakumari, MJP Publisher, Chennai, 2005

CO	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO1	Understand the basic components of	1,3,4,5	Understanding
	Environmental Chemistry		
CO2	Identify various types of Air pollutants	1,2,4,5	Applying
CO3	Analyse water pollution by theoretical	1,3,4,5	Analysing
	method		
CO4	Explain various types of soil pollutants	1,2,4	Evaluating
CO5	Improve Environmental resources by	1,3,4,5	Creating
	being aware of various pollutants		

## **Course Outcomes**

Semester	Course Code			Title of the Course			Hour	s	Credit			
v	21U	ECH61	C	FOOD			60		4			
				CHEM	IISTRY	7						
Course	F	Program	nme L	earning	g	Programme Specific						
Outcomes		Outco	omes (	s (PLOs)			Outcomes (PSOs)					
(COs)	PLO	PLO	PLO	PLO	PLO	PSO	PSO	PSO	PSO	PSO		
	1	2	3	4	5	1	2	3	4	5		
CO-1	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
CO-2	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$			
CO-3		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$		
CO-4	$\checkmark$			$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$		
CO-5				$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
	Number of matches (✓) = 36 Relationship = High											

SEMIESIEK - VI						
Course Title	PROJECT					
Total Hrs.	60					
Hrs./Week	4+4*					
Course Code	21UECH62					
Course Type	DSE-IV					
Credits	6					
Marks	100					

#### **SEMESTER - VI**

#### **GUIDELINES:**

- 1. The project may be done individually or in groups not exceeding five per group.
- 2. The minimum length of the project should be 30 pages in A4 size.
- 3. Marks for the project report will be 100 divided as 60% for the project and 40% for Viva-Voce Examination.

#### **EVALUATION SCHEME:**

The Project will be evaluated by both the Internal and External Examiners. Each Examiner will evaluate for 100 marks. The average mark obtained by the candidate is considered marks for the Project Report. The allocation of marks for Project is as follows:

#### Scheme of Evaluation:

Project	Internal	External
Word of title / Topic	5	5
Objectives / Formulation including Hypothesis	5	5
Review of Literature	10	10
Methodology / Techniques / Procedures adopted	15	15
Summary / Findings / Summation	10	10
Works Cited / Work Consulted / References / Annexures / Footnotes	10	10
Relevance of project to social needs	5	5
	60	60

#### SEMESTER – VI

<b>Course Title</b>	CHROMATOGRAPHY
Total Hrs.	30
Hrs./Week	2
<b>Course Code</b>	21USCH61
Course Type	SEC-V
Credits	2
Marks	100

#### **General Objectives:**

This course deals with the theory behind the basic concepts of chromatography and different chromatographic techniques like, column, paper, thin layer and high-performance chromatography.

#### **Course Objectives**:

CO	The learners will be able to :									
CO-1	Describe the basics and the theory behind chromatographic									
	separation.									
CO-2	Differentiate various types of chromatography based on the									
0-2	stationary and mobile phases.									
<u> </u>	Apply the idea of separating compounds by column									
0-5	chromatography.									
CO 4	Select the best paper chromatographic method for separation									
0-4	for compounds.									
	Formulate the High-Performance Liquid Chromatography for									
0-5	separation and purification of compounds.									

#### **UNIT I - Basic Concepts of chromatography:**

Chromatography- Principle of adsorption, partition, ion-exchange and size-exclusion chromatography - Classification based on principle - Various forms of Liquid Chromatography- Liquid Solid Chromatography- Liquid-Liquid Chromatography [Elementary ideas].

#### UNIT II – Column Chromatography

Principle – Techniques – Choice of stationary phase, Choice of mobile phase, Choice of Solvent Systems based on polarity, Choice of column, Separation techniques. Factors affecting Column efficiency- Application – Separation of methylene blue and fluorescein.

#### UNIT III - Paper Chromatography

#### **UNIT IV - Thin - Layer Chromatography**

 $\label{eq:principle} \begin{array}{l} \mbox{Principle} - \mbox{techniques} - \mbox{R}_f \mbox{value} - \mbox{Choice of adsorbents and Solvents.} \\ \mbox{Preparation of plates. Development of the Chromatogram. Detection of the} \end{array}$ 

spots. Advantages of thin Layer Chromatography over paper chromatography – preparative TLC. Applications of thin layer chromatography for the separation of vitamins and carbohydrates.

#### UNIT V - High Performance Liquid Chromatography

Principle and Instrumentation- Solvent Delivery System- Sample injection system- The Column- Column packing materials- Choice of supporting materials for separation – TLC and HPLC- Detectors in HPLC-Identification of solute peaks- Advantages- Derivatization in HPLC-Applications –Forensic Chemistry and monitoring the effects of pesticides.

#### **REFERENCE BOOKS:**

- 1. Chatwal G. R. and Anand S., Instrumental Methods of Chemical Analysis, Himalaya Publishing House, Mumbai, 1997.
- 2. Sharma B.K., *Chromatography*, Krishna Prakashan Media (P) Ltd., Meerut, India, 2019.
- 3. Sharma B.K., *Instrumental Methods of Analysis*, Goel publishing House, Meerut, 2003, India.
- 4. Skoog D.A., West D.M., Holler F.J. and Crouch S.R., *Fundamentals of Analytical Chemistry* Thompson Asia Private Ltd., Bangalore, 2004.
- 5. Rubinson J. F., *Contemporary Chemical Analysis* Prentice Hall (India), 1998, ISBN-13: 978-0135193310.
- 6. Kaur H., An Introduction to Chromatography, Pragati Prakashan, Meerut, India, 2001.
- 7. Palanivelu P., School of Biochemistry, MK University, Madurai, Laboratory Manual for Analytical Biochemistry & Separation Techniques, 2000.

#### **Course Outcomes**

CO	Upon completion of the course, the	PSOs Addressed	Cognitive
	students will be able to :	Auuresseu	Level
CO-1	Explain the theory, principle and	1,3,4	Knowing
	working of different		
	chromatographic techniques.		
CO-2	Classify the Chromatographic	1,3,5	Understanding
	techniques on the basis of principle		_
	and applications		
CO-3	Allocate the appropriate solvent,	1,2,4,5	Applying
	column size, stationary phases,		110 0
	mobile phases		
	L		
CO-4	Identifythe retardation factor for a	1,2,3,4	Analyzing
	compound, infer the results		
	accordingly to fix the polarity of the		
	compound.		
CO-5	Justify the selection and importance	1,3,5,	Evaluating
	of suitable chromatographic		Ū
	techniques like, TLC, column		
	chromatography, HPLC		

Semester	Course Code			Course Code Title of the Course			ourse	Hours		Credits		
VI	210	21USCH61 CHROMATOGR				RAPHY	3	0	2			
Course	Programme Learning Programme S						pecifi	C				
Outcomes		Outco	ome	<b>s (</b> ]	PLOs)		Outcomes (PSOs)					
(COs)	PLO1	PLO2	PLC	)3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	✓	✓				✓	✓		✓	✓		
CO-2	✓	✓				✓	✓		✓			
CO-3	✓	✓				✓	✓	✓	✓	✓		
CO-4	✓	✓				✓	✓	✓	✓			
CO-5	✓	✓			✓	✓	✓	✓			✓	
		Number of matches ( $\checkmark$ ) = 31										
		Relationship = Medium										
						-						

#### Allied Papers offered by Department of Chemistry

# Course TitleALLIED CHEMISTRY – ITotal Hrs.60Hrs./Week4Course Code21UACH31Course TypeALLIED-II/1Credits3Marks100

#### SEMESTER – III

#### General Objective:

To understand the various concepts of applied chemistry namely Photochemistry, Electrochemistry, Quantitative Analysis, Polymer Chemistry and Biochemistry

#### **Course Objectives:**

CO	The learners will be able to :
CO-1	Understand the Photochemical reaction and the various law pertaining to it
CO-2	Observe the Electrical conductivity of solutions and electrochemical cells
CO-3	Correlate the principles of volumetric analysis
CO-4	Distinguish the general properties polymers and the various methods of for the preparation of polymers
CO-5	Determine the Composition of basic biomolecules

#### UNIT I - PHOTOCHEMISTRY

Comparison between Thermal and Photochemical reactions - laws of photochemistry - Beer-Lambert's law - Grothus Draper law - Einstein's law - Quantum yield – Reasons for low and high quantum yield – Determination of quantum yield by actinometer – fluorescence - Phosphorescence – Thermoluminescence – Chemiluminescence and Bioluminscence - Photochemical cell - Estimation of Cu<sup>2+</sup> and Ni<sup>2+</sup> by Photo colorimeter

#### **UNIT II - ELECTROCHEMISTRY**

Conductance: specific, molar equivalent conductance pH, Buffer solution - Types: Acidic, Basic and Neutral - Henderson equation -Applications of pH and Buffer solutions.

Cells - Types - Galvanic, Daniel cell - electromotive force - Electrode potential - Standard Electrode Potential - Reference Electrodes - Standard Hydrogen Electrode - Saturated Calomel Electrode - Electrochemical Series and applications - Primary cell - Secondary Cell - Fuel cell.

#### **UNIT III - QUANTITATIVE ANALYSIS**

Methods of expressing the strength of solution - Normality, Molarity - Preparation of primary, secondary standard solutions.

Principle of volumetric analysis:Acid-Base titration - Redox Titration -Iodo/Iodimetric, Permanganometric, Dichrometric titrations -Complexometric - Precipitation titration.

Error analysis, types of errors- minimizing errors- accuracy and precision, methods of expressiong precision, mean, median, mean deviation, standard deviation and confidence limit- curve fitting, method of least squares- significant figures.

#### **UNIT IV - POLYMER CHEMISTRY**

General Characteristics of polymers in comparison with organic compounds - Methods of polymerization: Bulk, Suspension – Synthesis, Properties and uses of LDPE, HDPE, Polycarbonate, Polymethyl methacrylate, Poly aniline and Teflon - Biomedical applications of polymers.

#### **UNIT V - BIO CHEMISTRY**

Carbohydrates - Classifications - synthetic sweeteners - Structure of sucralose.

Amino acids - Classification - amphoteric nature - isoelectric point.

Proteins - Classification based on composition, solubility and shape - colour reaction - biological action.

Nucleic Acids - Purine, pyrimidine, Nucleosides, Nucleotides, Structure of t-RNA and DNA -Watson Crick Model.

#### **Reference Books:**

- 1. Puri, Sharma, Pathania, *Principles of Physical Chemistry*, 46<sup>th</sup>edition; Vishal Publishers: 2012.
- 2. Arun Bahl, Bahl B.S., Tuli G.D., *Essentials of Physical Chemistry*, 28<sup>th</sup> Edition; S. Chand& Company Ltd: New Delhi, 2020.
- 3. Vogel A.I., Textbook of Quantitative Chemical Analysis, 5<sup>th</sup> Edition; Longman: New York, 1989.
- 4. Gowariker V. R., Viswanathan, Sreedhar, *Polymer Science*, New Age International Ltd.: 2000
- 5. Nayak P.L., Lenka, *Textbook of Polymer Science*, Kalyani Publishers, New Delhi: 2000.
- 6. Sathynarayana U., Charapani U., *Biochemistry*, 5<sup>th</sup> Edition; Elsevier: India, 2020.

	Course Outcomes	5	
CO	Upon completion of the course, the	PSOs	Cognitive
	students will be able to :	Addressed	Level
CO-1	Observe the Photochemical reaction	1,2,3,5	Understanding
	and the various laws pertaining to it.		
CO-2	Examine the nature of electrode and	1,2,3,5	Applying
	electrolyte in an electrochemical cell		
CO-3	Analyse the types of errors in the	1,2,3,5	Analyzing
	Quantitative analysis		
CO-4	Explain the methods of	1,2,3,5	Evaluating
	polymerization techniques		
CO-5	Explain the Composition of basic	2,3	Evaluating
	biomolecules		

Semester	Course Code			Title of the Course				Hou	rs Cr	edits	
III	21UACH31			ALLIED CHEMISTRY-I				60		3	
Course	] ]	Program	nme L	earning	g	Programme Specific					
Outcomes		Outco	omes (	PLOs)		Outcomes (PSOs)					
(COs)	PLO	PLO	PLO	O PLO PLO		PSO	PSO	PSO	PSO	PSO	
	1	2	3	4	5	1	2	3	4	5	
CO-1	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	~		<ul> <li>✓</li> </ul>		
CO-2	✓	✓	<ul> <li>✓</li> </ul>	✓		✓	$\checkmark$		✓		
CO-3	✓	✓	<ul> <li>✓</li> </ul>	✓		✓	✓	✓	✓		
CO-4	✓	✓	✓	✓		✓	✓	✓	✓		
CO-5	✓	✓	$\checkmark$			✓	✓	✓	✓		
		Number of matches ( $\checkmark$ ) = 36									
		Relationship = High									
						-	0				

#### SEMESTER – III

Course Title	VOLUMETRIC ANALYSIS
Total Hrs.	30
Hrs./Week	2
<b>Course Code</b>	21UACH3P1
Course Type	AIIied Practical-II/1P
Credits	1
Marks	100/2

#### **General Objective:**

To visualize and observe various volumetric experiments

#### **Course Objectives:**

СО	The learners will be able to :
CO-1	Associate Volumetric principles for the determination of the strength of the solutions
CO-2	Calculate the strength of acid and base for the given solution by Acidimetric and alkali metric methods
CO-3	Examine the strength of KMNO <sub>4</sub> solution by Permanganometric method
CO-4	Figure out the amount of Calcium and Zinc in the given solution by complexometric method
CO-5	Determine the Calibration of glass apparatus used in the volumetric analysis

#### Acidimetry/Alkalimetry Titration

- 1. Estimation of NaOH
- 2. Estimation of  $Na_2CO_3$
- 3. Estimation of Sulphuric Acid

## Permanganometric Titration

- 4. Estimation of KMnO<sub>4</sub>
- 5. Estimation of Sodium Oxalate
- 6. Estimation of FAS

#### **Complexometric Titration**

- 7 Estimation of Calcium
- 8. Estimation of Zinc

#### **Course Work**

- 1. Calibration of Balance, Burette and Pipette
- 2. Estimation of Acetic acid in Commercial Vinegar
- 3. Estimation of Carbonate in Washing Soda

#### **REFERENCE BOOKS :**

- 1. Vogel A.I., Textbook of Quantitative Chemical Analysis, 5<sup>th</sup> Edition; Longman: New York, 1989.
- 2. Mukhopadhyay R., Chatterjee P., *Advanced Practical Chemistry*, 4<sup>th</sup> Edition; Books & Allied (P) Ltd.: Kolkata, 2007
- 3. Vishnoi N. K., *Advanced Practical Chemistry*, Vikas Publishing House: New Delhi,2005.
- 4. Ghoshal, Mahapatra, Nad, *Advanced Course in Practical Chemistry*, New Central Book Agency (P) Ltd: Kolkata,2000.
- 5. Bajpai D. N., Pandey O. P., GiriS., *Practical Chemistry*, S Chand & Co Ltd: New Delhi, 2013.

-											
со	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level								
CO-1	Associate Volumetric principles for the determination of the strength of the solutions	1,2,4,5	Understanding								
CO-2	Investigate the strength of acid and base for the given solution by Acidimetric and alkali metric methods	1,2,4,5	Applying								
CO-3	Analyze the strength of KMNO <sub>4</sub> solution by Permanganometric method	1,2,4,5	Analyzing								
CO-4	Estimate the amount of Calcium and Zinc in the given solution by complexometric method	1,2,4,5	Evaluating								
CO-5	Justify the Calibration of glass apparatus used in the volumetric analysis	1,2,4,5	Evaluating								

#### **Course Outcomes**

Semester	Course Code		de	Title Cou	of the urse		Hour	s	Cred	lits	
III	21UACH3P1			II 21UACH3P1 Volumetric			30		2		
				Ana	lysis	-					
Course	1	Program	nme I	Learning Programme S					Specific		
Outcomes		Outc	omes	(PLOs)			Outc	omes	(PSOs)	Os)	
(COs)	PLO1	PLO2	PLO3	3 PLO4 PLO5		PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1		✓	✓	✓		✓	✓		<ul> <li>✓</li> </ul>	✓	
CO-2		✓	✓	✓		✓	✓		<ul> <li>✓</li> </ul>	✓	
CO-3		✓	✓	✓		✓	✓		<ul> <li>✓</li> </ul>	✓	
CO-4		✓	✓	✓		$\checkmark$	✓		✓	<ul> <li>✓</li> </ul>	
CO-5		✓	✓	✓		✓	✓		✓	✓	
	Number of matches ( $\checkmark$ ) = 35										
				Rela	tionsh	ip = H	ligh				

#### **SEMESTER - IV**

Course Title	ALLIED CHEMISTRY-II
Total Hrs.	60
Hrs./Week	4
<b>Course Code</b>	21UACH41
Course Type	ALLIED –II/2
Credits	3
Marks	100

#### General Objective:

To understand the selected advanced topics in Chemistry namely Coordination Chemistry, Organic Chemistry, Solutions, Chromatography and Spectroscopy

#### **Course Objectives:**

CO	The learners will be able to :								
CO-1	Compute the oxidation number of metal ion in complex								
00-1	structure								
CO-2	Obtain the E,Z notation in the Geometrical isomers								
CO-3	Explore the concept of solution phase								
CO-4	Analyze the concept of chromatographic technique								
COF	Verify the concept of uv-visible and FT-IR spectroscopy for the								
0-5	analysis of organic molecules								

#### **UNIT I- Coordination Chemistry**

Coordination Chemistry: Terminology, Calculation of Oxidation number in complexes -Classifications of ligands - Nomenclature - Werner's coordination Theory. Effective Atomic Number rule (EAN) - Pauling's Theory – Postulates - Application to Ni(CO)<sub>4</sub> and  $[Ni(CN]_4]^{2-}$ 

#### **UNIT II- ORGANIC CHEMISTRY**

Aromaticity – Huckle's rule with examples – Benzenoid and Nonbenzenoid aromatic compounds (definition and examples only).

Preparation, properties of benzene, naphthalene and anthracene.

Optical isomerism - optical activity – conditions – Chiral Centre elements of symmetry - optical rotations - optical activity of tartaric acid -Geometrical isomerization - E,Z Nomenclature

#### **UNIT III- SOLUTIONS**

Raoult's law, Henry's law - Ideal and non - ideal solutions - vapour pressure of real solution - deviation from Raoult's law - theory of fractional distillation - benzene - toluene system, Azeotropic mixture - ethanol - water, HCl -  $H_2O$ , Immiscible liquids - theory of steam distillation - applications.

#### UNIT IV- CHROMATOGRAPHY

Principle of chromatographic technique and types - stationary phase, mobile phase, Classification of solvents based on polarity.

Paper chromatography: Principle,  $R_f$ values, Factors affecting  $R_f$  values, Experimental procedures, Choice of paper and solvent systems, development of chromatogram. Detection of the spots. Ascending, Descending and Radial Paper Chromatography – Applications – separation of amino acids.

#### **UNIT V- SPECTROSCOPY**

Electromagnetic Region, Types of molecular spectra. Colorimeter -Principle and Application. UV Spectroscopy - Theory - types of electronic transitions - Instrumentation - single and double beam spectrophotometer – applications. FT-IR spectroscopy - principle and applications - Hydrogen bonding - Aldehyde and Ketone.

#### **REFERENCE BOOKS :**

- 1. Gopalan R., Ramalingam V., *Concise Coordination Chemistry*,1<sup>st</sup> Edition; Vikas Publication: New Delhi, 2008.
- 2. Sathyaprakash, Madan*Advanced Inorganic Chemistry vol.* 1, S. Chand Company: New Delhi, 2005
- 3. Bahl, Arun Bahl, Organic Chemistry, S. Chand Company: New Delhi, 2010
- 4. Sharma B.K., *Chromatography*, KP Goel Publishing House: New Delhi, 2014.
- 5. Kapoor K.L., *A Textbook of Physical Chemistry- Volume* 1,3<sup>rd</sup> Edition; Macmillan Publishers Ltd: New Delhi, 2001.
- 6. Chatwal G.R., Anand S.K., *Spectroscopy*, 5<sup>th</sup> Edition; Himalaya Publishing House: New Delhi, 2016.
- 7. Sharma Y.R., *Elementary of Organic Spectroscopy*, 5<sup>th</sup> Edition;S.Chand: New Delhi, 2013.

СО	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Estimate the oxidation number of metal ion in complex structure	1,2,3	Understanding
CO-2	Identify the E,Z notation in the Geometrical isomers	1,2,3	Understanding
CO-3	Examine the concept of solution phase	1,2,3	Applying
CO-4	Analyze the concept of chromatographic technique	1,2,3	Analyzing
CO-5	Verify the concept of uv-visible and FT-IR spectroscopy for the analysis of organic molecules	1,2,3	Evaluating

#### **Course Outcomes**

Semester	ster Course Code Title of the Course			e H	Iours	Cre	dits				
IV	211	Chemi	istry-I	I	60		3				
Course	] ]	Progran	nme I	earnin	g	Programme Specific					
Outcomes		Outco	omes	(PLOs)			Outc	omes (	PSOs)		
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	✓	✓		<ul> <li>✓</li> </ul>		✓	✓	✓			
CO-2	✓	$\checkmark \qquad \checkmark \qquad$				✓					
CO-3	✓	✓	$\checkmark \qquad \checkmark \qquad$					✓			
CO-4	✓	✓	✓	<ul> <li>✓</li> </ul>		✓	✓	✓	✓		
CO-5	✓	✓	✓	✓		✓	✓	✓	✓		
		Number of matches ( $\checkmark$ ) = 34									
	Relationship = High										
						-	-				

#### SEMESTER - IV

Course Title	CHEMICAL ANALYSIS
Total Hrs.	30
Hrs./Week	2
<b>Course Code</b>	21UACH4P1
<b>Course Type</b>	Allied Practical – II/2P
Credits	3
Marks	100/2

#### General Objective:

To get acquaintance of certain experiments related to the food industries, analysis of metal ion (Cu<sup>2+</sup> and Ni<sup>2+</sup>) in water sample and optical activity of organic molecules.

#### **Course Objectives:**

СО	The learners will be able to :
CO-1	Identify the pH of the aerated drinks and juice
CO-2	Examine the conductivity of the solution
CO-3	Distinguish the mono and disaccharides
CO-4	Detect the Ni <sup>2+</sup> andCu <sup>2+</sup> ions in the given solutions
CO-5	Estimate the optical activity of organic compounds

#### List of Experiments

- 1. Determination of pH of the given unknown solution (Aerated Drinks, Juice).
- 2. Determination of the strength of HCl using standard NaOH solution by conductometric method
- 3. Separation of pigments present in spinach leaves by ascending paper chromatography.
- 4. Separation of the mono and disaccharides [Glucose, Fructose, Sucrose] by ascending paper chromatography.
- 5. Separation and identification of amino acids by ascending paper chromatography
- 6. Determination of  $Cu^{2+}$  ion concentration by colorimeter
- 7. Determination of  $Ni^{2+}$  ion concentration by colorimeter
- 8. Determination of optical activity of given organic compounds by polarimeter

#### **REFERENCE BOOKS :**

- 1. Patel H.N., College *Practical Chemistry*, Himalaya Publishing House: New Delhi, 2010.
- 2. Vogel A.I., Textbook of Quantitative Chemical Analysis, 5<sup>th</sup> Edition; Longman: New York, 1989.
- 3. BajpaiD. N., Pandey O. P., GiriS., *Practical Chemistry*, S Chand & Co Ltd: New Delhi,2013.
- 4. VishnoiN. K., Advanced Practical Chemistry, Vikas Publishing House: New Delhi,2005.
- 5. Ghoshal, Mahapatra, Nad*Advanced Course in Practical Chemistry*, New Central Book Agency (P) Ltd: Kolkata, 2000.

#### **Course Outcomes**

CO	Upon completion of the course, the students will be able to :	PSOs Addressed	Cognitive Level
CO-1	Identify the pH of the aerated drinks and juice	1,2,3,5	Understanding
CO-2	Estimate the conductivity of the solution	1,2,3	Applying
CO-3	Distinguish the mono and disaccharides	1,2,3	Analyzing
CO-4	Categorize the Ni <sup>2+</sup> andCu <sup>2+</sup> ions in the given solutions	1,2	Evaluating
CO-5	Assess the optical activity of organic compounds	2,3	Evaluating

Semester	Cou	rse Co	de	Title of the Course					Hours		Credits	
IV	210	JACH4F	P1	Indu	ıstrial	Analy	30	30		3		
Course	1	Prograr	nme 🛛	Learning Program				mme S	nme Specific			
Outcomes		Outco	omes	(PLOs)	<b>Outcomes (PSOs)</b>							
(COs)	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PS	04	PSO5	
CO-1	$\checkmark$	✓	$\checkmark$	✓		✓	$\checkmark$	$\checkmark$	✓			
CO-2	$\checkmark$	✓	$\checkmark$	✓		✓	✓	✓	✓			
CO-3	$\checkmark$	✓	$\checkmark$	✓		✓	$\checkmark$	$\checkmark$	$\checkmark$			
CO-4	$\checkmark$	✓	$\checkmark$	✓		✓	$\checkmark$	$\checkmark$				
CO-5	$\checkmark$	✓	✓	✓		✓	$\checkmark$					
	Number of matches ( $\checkmark$ ) = 37											
		Relationship = High										
						-	-					

#### THE SCHEME OF EXAMINATIONS UNDER CHOICE BASED CREDIT SYSTEM

- The medium of instruction in all the UG and PG Programmes is English and Students shall write the CIA Tests and the Semester Examinations in English. Three CIA Tests for one hour each will be conducted. For the calculation of CIA Tests marks the average of the best two tests will be taken. The portion for each test can be 1.5 units of the unitized syllabi.
- Two assignments for the Undergraduate Programmes and one assignment and one seminar for the Postgraduate Programmes are compulsory.
- Two Practical Examinations will be conducted for CIA at the end of the semester and the average will be taken.

# Distribution of Marks for the Students admitted into the UG and PG Programmes from the academic year 2021-2022

Undergraduate, Certificate, Diploma and Advanced Diploma Programmes						
Course Type	TOTAL MARKS	CIA TESTS MAX.MARKS	SEMESTER EXAMINATION Max. Marks	PASSING MINIMUM		
				CIA	SEM. EXAM	OVERALL
Theory	100	25	75	Nil	30	40
Practical (2Hrs.)	50	20	30	Nil	12	20
Practical (4Hrs.)	100	40	60	Nil	24	40
Project	100	Nil	Report- 60 Marks Viva-Voce- 40 Marks	Nil	Nil	100

#### **CIA Tests and Semester Examinations**

Postgraduate Programmes						
	TOTAL MARKS	CIA MARKS	SEMESTER EXAM	PASSING MINIMUM		
Course Type				CIA	SEM. EXAM	OVERALL
Theory	100	40	60	Nil	30	50
Practical	50	20	30	Nil	15	25
Practical (for PG Maths only)	100	40	60	Nil	30	50
Project Report	150	Nil	Project Report- 90 Marks Viva-Voce Examination - 60 Marks	Nil	Nill	150

#### CIA TESTS

#### **Distribution of Marks**

Components (A)		Assignment (B)	Seminar (C)	Record Note (D)	Total (A+B+C+D)		
	Ι	II	III				
	20	20	20	5			25
UG-Theory	The Average of the Best			5	-	-	23
	Two Tests:20						
	30	30	30				
PG-Theory	The Average of the Best			5	5	-	40
	Two Tests:30						
UG-	15	15					
Practical	The Average of the Tests:		-	-	5	20	
(2 hrs)	15						
UG-	30 30						
Practical	The Average of the Tests:		-	-	10	40	
(4 hrs)	30						
PG-Practical	15	1	5				
	The Average of the Tests:			-	-	5	20
	15						
PG-Practical	30 30						
(Maths	The Average of the Tests:		-	-	10	40	
only)	30						

#### **Question Pattern for CIA Test (Theory)**

Programme	Question Paper Pattern				
	Part-A	Part-B	Part-C		
		Internal Choice	Internal Choice	]	
	MCQs-	(Either or type).	(Either or type)	20	
UG	8x0.5=4	2x4=8 marks	1x8=8 marks	20	
	marks	Answer should not	Answer should not		
		exceed 250 words	exceed 500 words		
		Internal Choice	Internal Choice		
	MCQs-	(Either or type)	(Either or type)		
PG	20x0.5=10	3x4=12 marks	1x8=8 marks	30	
	marks	Answer should not	Answer should not		
		exceed 250 words	exceed 500 words		

#### **End Semester Examination (ESE)**

The students who have put in the required number of days of attendance are eligible to appear for the End Semester Examinations irrespective of whether they have passed in the CIA Tests or not. They have to pay the examination fees for all the current courses and the arrear courses, if any, and submit the application form before the due date specified for the purpose. For any reason, the dates will not be extended. Hall tickets will be issued only for those who have paid the fees. The question papers for the End Semester Examinations for all the theory courses of the UG and the PG Programmes will be set for 75 marks.

Programme		Total (A+B+C)		
	Part-A	Part-B	Part-C	
UG	MCQs- 30x0.5=15 marks	Internal Choice (Either or type) 5x4=20 marks Answer should not exceed 250 words	Internal Choice (Either or type) 5x8=40 marks Answer should not exceed 500 words	75
PG	MCQs- 30x0.5=15 marks	Internal Choice (Either or type) 5x4=20 marks Answer should not exceed 250 words	Internal Choice (Either or type) 5x8=40 marks Answer should not exceed 500 words	$(\frac{x}{75}$ <b>x 60</b> ) 60

**Question Pattern for End Semester Examinations (Theory)** 

#### The Question Paper Pattern for the End Semester Examinations (Practical)

The Question Paper Pattern is designed by the respective departments.