

M.Phil. CHEMISTRY

SEM	SUB CODE	COURSE	SUBJECT TITLE	HRS / WEEK	CREDIT	CIA Mark	ESE MARK	TOTAL MARK
I	20MPCH1CC1	Core – I	Research Methodology	4*	4	25	75	100
	20MPCH1CC2	Core – II	Advanced Physical Methods and Molecular Modelling in Chemistry	4*	4	25	75	100
	20MPCH1CC3	Core – III	Teaching and Learning Skills (common paper)	4*	4	25	75	100
	20MPCH1CC4	Core - IV (Elective)	Paper on Topic of Research (The syllabus will be prepared by the Guide and Examination will be conducted by the COE)	4*	4	25	75	100
		*One hour library for each course						
	TOTAL			16*	16			400
II	20MPCH2PD		Dissertation##	-	8	-	-	200
GRAND TOTAL				16	24			600

Evaluation of the Dissertation and Viva Voce shall be made jointly by the Research Supervisor and the External Examiner.

Semester	Code	Course	Title of the Course	Hours	Credits	Max. marks	Internal marks	External marks
I	20MPCH1CC1	Core – I	RESEARCH METHODOLOGY	4	4	100	25	75

Course Outcomes (COs):

At the end of the course, scholars will be able to

CO1: Apply the principles of research

CO2: Know the survey of literature using internet resources

CO3: Report research findings as manuscript and thesis

CO4: Solve analytical data using statistical approach

CO5: Apply information technology skills in research

Unit - I Principles of Research

12 hours

Definition - Need for research. Objectives – Motivation – Types of research – Significance - Formulation of Research Problem – Developing Hypothesis - Preparing Research Design - Selection of Research Problem – Determining Sample Design Characteristics of a Good Sample Design - Collection of Data – Methods of Data Collection - Execution of Work. Analysis of Data – Hypothesis, Testing - Generalization and Interpretation - Preparation of Report - #Submission of Report in the form of Thesis #

Unit - II Survey of Literature

12 hours

Need for literature survey – Primary, Secondary and Tertiary Sources. Journals, Chemical Abstracts – Subject index, Substance index, Author index, Formula index and other indices. Other similar abstracts for special topics. Current Titles – Reviews – Monographs – Selection of Research topic – Selection of Research Facility – Location of Journals and Articles. Use of computers in the Literature Survey – Websites – Search Engines - chemspider, google scholar, scifinder, scopus, Internet, E-mail. #Scientific Information and Documentation Centers – INSDOC, BANSDOC, NCSI, British Library – Digital Library – e-Journals – e-Content #.

Unit - III Assignment, Research Paper and Thesis Writing

12 hours

Assignment – Topic selection, Front Page, Text and References. Research Paper – Preparation of Manuscript for Publication in International Journals Published by Elsevier, Interscience, Wiley and Springer- submission procedure. Thesis - Rough drafting – Title, Abstract, Introduction, Scope of the Work, Literature Review, Problem and Time Limitation, Experimental Methods, Results and Discussion Foot Notes- Data Presentation - Figures and Tables, Sign Conventions followed, bibliography, Conclusion and Recommendations. Abbreviations used. #Storing and Retrieval of Information using Computer – CD, Pen Drive, DVD#.

Unit – IV Statistical Analysis of Data**12 hours**

Various types of errors – precision and accuracy – significant figures, various statistical tests on the accuracy of results, positive and negative deviation from accurate results – the Gaussian distribution – the normal distribution of random errors, mean value, variance and standard deviation, reliability interval, deviations from the Gaussian law of error distribution, t-tests- comparison of the mean with the expected value, comparison of the results of two different methods, comparison of the precision of two methods by F-test, Gross errors and elimination of outlying results, graphical methods – Linear regression, regression line, [#] standard deviation, correlation coefficient[#]–Multiple Linear regression (one variable with two other variables).

Unit – V Information Technology Skill**12 hours**

Internet – meaning and importance, types of networking – LAN, WAN and MAN – Internet – www, website and webpage's, mode of connection, network protocols-TCP, IP and HTTP, browsing the internet – browsing softwares, URL addresses, domain name, search engines, exploring websites and downloading materials from websites, E-mail – sending, receiving and storing mail and chatting. Power point – creating a presentation – slide preparation – [#] popular websites for data collection in chemistry[#].

#..... # Self study

TEXT BOOKS:

S. No.	Author Name	Book Name	Edition	Publisher detail	Year	Units Covered
1	C.R. Kothari	Research Methodology: Methods & Techniques	2 nd Edition	Vishwa Prakasan, India	2002	I, II & III
2	Scoog, West, Holler and Crouch.	Analytical Chemistry	8 th Edition	Thomson – India	2007	IV
3	Zikr – ur Rahman	Modern Teaching Methods and Techniques	1 st Edition	Anmol Publication Pvt. Ltd, New Delhi	2006	V
4.	T. Srinivasan M.	Use of Computers and Multimedia in Education	1 st Edition	Aavisakar Publication, Jaipur	2002	V

BOOKS FOR REFERENCES

S. No.	Author Name	Book Name	Edition	Publisher detail	Year	Units Covered
1	J. Anderson, B.H. Durston and M. Poole	Thesis and Assignment Writing	Reprint	John Wiley Publications, Sydney.	1987	I, II & III
2	R. Berry	How to Write a Research Paper	2 nd Edition	Pergoman, India	1986	III
3	R.M. Verma	Analytical Chemistry: Theory and Practice	3 rd Edition (Reprint)	CBS Publishers and Distributors, New Delhi	2018	IV
4.	K.V. Raman	Computers in Chemistry	1 st Edition	Tata McGraw-Hill Publishing company Limited, New Delhi	2004	V

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code					Title of the Course					Hours	Credits
I	20MPCH1CC1					Research Methodology in Chemistry					4	4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓			✓	✓		✓	✓		
CO2	✓	✓		✓	✓	✓		✓	✓			
CO3	✓		✓	✓		✓	✓	✓	✓	✓		
CO4		✓	✓	✓	✓				✓	✓		
CO5		✓		✓	✓	✓	✓		✓	✓		
Number of Matches= 35 Relationship is : High												

Prepared by:
Dr. K. LOGANATHAN

Checked by:
Dr. A. JAFAR AHAMED

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. marks	Internal marks	External marks
I	20MPCH1CC2	Core – II	ADVANCED PHYSICAL METHODS AND MOLECULAR MODELLING IN CHEMISTRY	4	4	100	25	75

Course outcomes (COs):

At the end of the course, students will be able to

CO1: Categorize the features of nanomaterials based on their applications.

CO2: Predict the complicated structures using correlation technique

CO3: Deduce the geometry and magnetic properties of inorganic complexes.

CO4: Analyse the molecular interactions by adapting molecular modelling.

CO5: Assess the Drug ability of a molecule by simulation method.

Unit I - Characterization and Applications of Nano Materials

12 hours

Surface morphology and nanostructure – Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM) and Atomic Force Microscope (AFM); [#]Structural Characterization - UV-Visible and FT-IR spectroscopy[#]; Structure orientation and micro texture- X-ray Diffraction (XRD); Elemental analysis – Energy Dispersive X-ray Micro analysis (EDX) and Atomic Absorption Spectroscopy(AAS).

Applications of carbon nanomaterials in the field of fuel cells and batteries; Energy and environmental applications- Energy production and storage - Applications of nanomaterials in electronics- semiconductors and chemical sensors, biotechnology- detection of biomolecules and medicine-drug design and drug delivery.

Unit II– 2D-NMR and NQR spectroscopy

12 hours

2D- NMR – basic principle and types-homonuclear through-bond correlation methods- Correlation spectroscopy (COSY- ¹H-¹H COSY & ¹H-¹³C COSY), Exclusive correlation spectroscopy (E COSY), Total correlation spectroscopy (T COSY), Incredible natural-abundance double-quantum transfer experiment (INADEQUATE)- Heteronuclear through-bond correlation methods-Heteronuclear single-quantum correlation spectroscopy (HSQC), Heteronuclear multiple-bond correlation spectroscopy (HMBC)- Through-space correlation methods-Nuclear Overhauser effect spectroscopy (NOESY), Rotating frame nuclear Overhauser effect spectroscopy (ROESY)-[#] Resolved-spectrum methods-Higher-dimensional methods[#].

NQR spectroscopy – Characteristics of quadrupolar nucleus – effects of field gradient and magnetic field upon quadrupolar energy levels – NQR transitions – applications of NQR spectroscopy.

Unit – III –Inorganic Spectroscopy**12 hours**

^{31}P , ^{14}N and ^{15}N NMR spectra – basic theory, standard reference, chemical shift, coupling constants and biological applications. Combined applications of UV-Visible, FT-IR, Raman and EPR spectral data for solving the structure of metal (Co, Ni, Cu and Zn) complexes- ^1H -NMR spectra of zinc complexes[#] - Magnetic studies for the characterization of the complexes by VSM.

Unit -IV Molecular Modelling-I**12-hours**

Molecular Modelling – definition and importance-types of molecular model- spheres, ball-and-stick, skeletal, polyhedral, composite and computer-based models- molecular mechanics- software for molecular mechanics modeling - coordinate systems- potential energy surfaces- molecular graphics- definition, relation with molecular models- [#]non-bonded interactions- electrostatic and van der Waals interactions in molecular modelling[#] - hydrogen bonding in molecular mechanics.

Unit-V Molecular Modelling –II**12-hours**

Computer simulation methods- definition and advantages- data preparation and process for the preparation of computer simulation model- softwares for simulation- differences between simulation and model- types of simulation models- force field model for the simulations of liquid water-[#]calculation of simple thermodynamic properties, phase space[#], drug design and delivery using simulating models.

#..... # Self study

TEXT BOOKS:

S. No.	Author Name	Book Name	Edition	Publisher detail	Year	Units Covered
1	T. Pradeep	Nano: The Essential Understanding Nanoscience and Nanotechnology	1 st Edition, (Reprint)	Tata McGraw-Hill, New Delhi	2020	I
2	P. S. Kalsi	Spectroscopy of Organic Compounds	6 th Edition	New Age International Publishers. New Delhi	2007	II
3	William Kemp	NMR in Chemistry	3 rd Edition (Reprint)	Palgrave, USA	2011	III
4.	R. S. Drago	Physical Methods in Chemistry	Reprint	W. B. Saunders	2017	III
5.	Andrew R. Leach	Molecular Modelling	2 nd Edition	Pearson Prentice Hall, England	2001	IV & V

1.,

BOOKS FOR REFERENCES:

S. No.	Author Name	Book Name	Edition	Publisher detail	Year	Units Covered
1	C. P. Poole Jr and F. J. Ownes	Introduction to Nano Technology	1 st Edition	John Wiley and New Jersey	2003	I
2	B. P. Straughan and S. Walker	Spectroscopy, Vol. 1	1 st Edition (Reprint)	Chapman and Hall, UK	2018	II
3	H. Kaur	Spectroscopy	3 rd Edition	Pragati Prakashan Publications, Meerut	2006	II & III
4	E. A.V. Ebsworth, W.H. Rankin and Craddock	Structural Methods in Inorganic Chemistry	2 nd Edition	ELBS	1991	III
5	Willard, Merrit, Dean and Settle	Instrumental Methods of Analysis	6 th Edition	CBS Publishers and Distributors, India	1986	II & III
6.	Alan Hinchliffe	Molecular Modelling for Beginners	2 nd Edition	Wiley Publication, India	2008	IV & V

Mapping:**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:										
Semester	Code		Title of the Course					Hours	Credits	
I	20MPCH1CC2		ADVANCED PHYSICAL METHODS AND MOLECULAR MODELLING IN CHEMISTRY					4	4	
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		✓	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓	✓	✓		✓	✓	✓	✓	✓
CO3	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓			✓	✓	✓
CO5		✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches=39, Relationship is : HIGH										

Prepared by:

Dr. M. Purushothaman

Checked by:

Dr. M. Syed Ali Padusha

Note:

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

Semester	Code	Course	Title of the Course	Hours	Credits	Max. marks	Internal marks	External marks
I	20MPCH1CC 3	Core – III	TEACHING AND LEARNING SKILLS	4	4	100	25	75

Course outcomes (COs):

At the end of the course, students will be able to

CO1: Apply the different types of communication and interaction methods for effective teaching

CO2: Know the concepts of education psychology

CO3: Understand the different kinds of teaching strategies

CO4: Adopt the modern education technologies in teaching

CO5: Provide guidance and counseling for students

Unit - I

12 hours

Communication and Interaction

The theory of communication – communication cycle – Types of communication, communication and language, communication in the class room, Lecture and Lecture demonstration as communication. Interaction methods – Interaction analysis, observation schedule and record. Bale's interaction process categories – Flander's system of interaction analysis – verbal interaction category system. #Reciprocal category system – Equivalent talk categories#.

Unit – II

12 hours

Educative Skill

Psychology – Definition – Nature – Meaning of Educational Psychology – Definition – Nature – Scope. Teaching and learning – meaning – characteristics –effective teaching – concept of learning –comparison between teaching and learning. Mental health – Frustration –# concept of adjustment – Defence mechanism# – Mental hygiene.

Unit – III

12 hours

Uses of teaching strategies

Group methods of instruction – lecture – demonstration – seminars – workshops – case analysis – panel discussion – team teaching – individual approaches – Teleconferencing – Video conferencing – Description – Advantages – Micro teaching –Characteristics of Micro teaching – Teaching skills - Programmed Instruction - Computer Assisted Instruction (CAI) – # Language Laboratory#.

Unit – IV

12 hours

Educational Technology

Educational technology – definition – objectives – teaching technology – characteristics of teaching technology – behavioural technology – pedagogy of teaching – General advantage of using teaching aids – Broad classification of teaching aids – Hardware and software in teaching aids. Instructional media – media attributes – multimedia and instructional development – # Multimedia centre – uses and abuses of multimedia#.

Unit-V**12 hours****Guidance and Counselling**

Meaning and definition of Guidance and Counselling- need for guidance – aims of guidance- nature of guidance - principles of guidance philosophy- types of guidance- educational, vocational, personal and social guidance- benefits of guidance- benefits to students, teachers, parents community and administrators – role and functions of guidance cell – Counsellor-definition, qualities of a good counsellor, characteristics of counselling, #types of counselling# class teacher as a counsellor- specific duties of a teacher in guidance service, differences between guidance and counselling.

#..... # Self study

Text Books

S. No.	Author Name	Book Name	Edition	Publisher detail	Year	Units Covered
1	Zikr – ur Rahman	Modern Teaching Methods and Techniques	5 th Edition	Anmol Publications Pvt Ltd, New Delhi	2005	I, II, III & IV
2	R. A. Sharma	Educational Technology and Management Models Media and Methods	1 st Edition	R. Lall Book Depot. Meerut	2011	I, II & IV
3	Vanaja	Educational technology	7 th Edition	Neel Kamal publications Pvt. Ltd. Hyderabad	2016	IV & V
4.	K. Nagarajan and Deva Seetharaman	Psychology of learning and Human Development	2 nd Edition	Sriram Publishers, Chennai	2014	IV & V

Books for References

S. No.	Author Name	Book Name	Edition	Publisher detail	Year	Units Covered
1	B. N. Dash	Elementary Educational Psychology and Methods of Teaching	1 st Edition	Neel Kamal publications Pvt. Ltd., New Delhi	2007	I, II, III & IV
2	P. Sambasiva Rao and D. Bhaskar Rao	Techniques of Teaching Psychology	1 st Edition	Sonali Publications, New Delhi	2006	I, II & III
3	S. K. Kochhar	Methods and Techniques of Teaching	1 st Edition	Sterling Publisher Pvt. Ltd, New Delhi	2013	I & III
4.	K. Sampath, A. Panner selvam and S. Santhanam	Introduction to Educational Technology	4 th Revised edition	Sterling Publisher Pvt. Ltd	2000	IV & V
5.	S. Robinson	Fundamentals of Education Psychology	2 nd Edition	Ane Books Pvt. Ltd	2008	IV
6.	T.M. Srinivasan	Use of Computers and Multimedia in Education	1 st Edition	Aavisakar publication, Jaipur	2002	IV

Web References: https://swayam.gov.in/nd2_ntr20_ed21/preview

Mapping:

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code					Title of the Course			Hours		Credits	
I	20MPCH1CC3					TEACHING AND LEARNING SKILLS			4		4	
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2	✓	✓	✓		✓	✓	✓	✓	✓			
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CO4	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO5	✓	✓	✓		✓	✓	✓	✓		✓		
Number of Matches= 44, Relationship is : High												

Prepared by:

Dr. J. SIRAJUDEEN

Note:

Checked by:

Dr. A. ZAKIR HUSSIAN

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very poor	Poor	Moderate	High	Very high

