

B.Sc. CHEMISTRY
SYLLABUS - 2017

SCHOOLS OF EXCELLENCE
with
CHOICE BASED CREDIT SYSTEM (CBCS)

SCHOOL OF PHYSICAL SCIENCES

St. JOSEPH'S COLLEGE (Autonomous)

Special Heritage Status Awarded by UGC

Accredited at "A" Grade (3rd cycle) by NAAC

College with Potential for Excellence Conferred by UGC

DBT-STAR & DST-FIST Sponsored College

TIRUCHIRAPPALLI - 620 002, INDIA

B.Sc. CHEMISTRY
COURSE PATTERN - 2017 SET

Sem	Part	Code	Subject Title	Hrs	Crs		
I	I	Language	17UGT110001	Tamil I/Hindi I/ French I/Sanskrit I	4	3	
	II	English	17UGE120101	General English I	5	3	
	III	Core		17UCH130201	General Chemistry I	7	5
			@		Chemistry Practical I	3	@
			@		Chemistry Practical II	3	@
		Allied	17UCH130401	Allied: Mathematics - I	6	4	
	IV	NMC	17UCE140801	Communicative English	-	5	
		V. Edn	17UFC141001	Essentials of humanity	2	2	
			Total of Semester I	30	22		
II	I	Language	17UGT210002	Tamil II/Hindi II/ French II/Sanskrit II	4	3	
	II	English	17UGE220102	General English II	5	3	
	III	Core		17UCH230202	General Chemistry II	5	4
				17UCH230203	Chemistry Practical I	3	4
				17UCH230204	Chemistry Practical II	3	4
		Allied	17UCH230402	Allied: Mathematics - II	6	4	
	IV	NMC	17UCE240802	Computer Literacy/SAP	2	2	
		V. Edn	17UFC241002	Fundamentals of human rights	2	2	
			Total for semester II	30	26		
III	I	Language	17UGT310003	Tamil III/Hindi III/French III/Sanskrit III	4	3	
	II	English	17UGE320103	General English III	5	3	
	III	Core		17UCH330205	General Chemistry III	4	3
				17UCH330206	Essentials of <i>p</i> -Block Elements	4	3
			@		Chemistry Practical III	3	@
		Allied	14UCH330403A 14UCH330403B	Allied: Physics - I (or) Allied: Biochemistry - I	4	4	
		Allied	@	Allied: Physics Practical - I (or) Allied: Biochemistry Practical - I	2	@	
	IV	NMC/ EVS	17UCE340901	Environmental Studies (Partial online course)	2	2	
	V. Edn	17UFC341003A	Formation of Youth -I (or)	2	2		
17UFC341003B		Religion Doctrine-I					
			Total for semester III	30	20		
IV	I	Language	17UGT410004	Tamil IV/Hindi IV /French IV /Sanskrit IV	4	3	
	II	English	17UGE420104	General English IV	5	3	
	III	Core		17 UCH 430207	General Chemistry IV	6	5
				17 UCH 430208	Chemistry Practical III	3	3
		Core Elective I (WS)		17UCH430301A 17UCH430301B	Chemistry of Materials (or) Health and Hygiene	4	4
			Allied		17UCH430404A 17UCH430404B	Allied: Physics - II or Allied: Biochemistry - II	4
					17UCH430405A 17UCH430405B	Allied Physics Practical or Allied Biochemistry Practical	2
	IV	V. Edn	17UFC441004A	Formation of Youth -II (or)	2	2	
			17UFC441004B	Religion Doctrine-II			
	IV-V	Core	17UCH430209	Internship (During summer holidays)	-	2	
			Total for semester IV	30	28		

V	III	Core	17 UCH530210	Inorganic Chemistry I	5	4
			17 UCH530211	Organic Chemistry I	5	4
			17 UCH530212	Physical Chemistry I	4	3
			@	Chemistry Practical IV	4	@
			@	Chemistry Practical V	4	@
	Core Elective II (WD)	17UCH530302A	Core Elective: Selected Topics in Chemistry-I (or)	4	4	
		17UCH530302B	Core Elective: Selected Topics in Chemistry-II			
	SPL	17UCH530213	Essentials of Chemistry (Partial online course)	-	2	
	Additional core	17UCH530501	Advanced Topics in Chemistry – I (Extra credits)	-	(2)	
	IV	SB Elective - I	17UCH540601	Inter-disciplinary skill based course – Food and Nutrition (<i>Between School</i>)	2	2
IV	IDC	17USS540701A	Soft Skills	2	2	
		17USS540701B	National Cadet Corps (For NCC Cadets)			
Total for semester V					30	21
VI	III	Core	17UCH630214	Inorganic Chemistry II	5	4
			17UCH630215	Organic Chemistry II	5	4
			17UCH630216	Physical Chemistry -II	6	4
			17UCH630217	Chemistry Practical IV	4	4
			17UCH630218	Chemistry Practical V	4	4
	Core Elective III (WD)	17UCH630303A	Chemistry of Biomolecules (or)	4	4	
		17UCH630303B	Pharmaceutical Chemistry			
	Additional Core II	17UCH630502	Advanced Topics in Chemistry - II	-	(2)	
	IV	SB Elective II	17UCH640602	Everyday Chemistry (<i>Within School</i>)	2	2
III	Core	17UCH630219	Comprehensive Examination	-	2	
Total for semester VI					30	28
I -VI	V	Shepherd	17UCW651101	Community service Work (SHEPHERD) & Gender studies		5
Total Credit for all semesters					180	150 +4

பொதுத்தமிழ் - 1

கற்றலின் உறுதிப்பாடு

1. சமூகமாற்றச் சிந்தனைகளை உள்ளடக்கியதற்காலஇலக்கியப்பரப்பை அறிதல்
2. புதுக்கவிதை, சிறுகதை உரைநடை ஆகியவற்றின் இலக்கியத்திறன் கண்டறிதல்.
3. சந்திப்பிழையின்றி எழுதும் திறன் பெறுதல்

அலகு-1 மகாகவி பாரதியார் கவிதைகள்
பாரதிதாசன் கவிதைகள்
நாமக்கல் கவிஞர் கவிதைகள்
உரைநடை- முதல் மூன்று கட்டுரைகள் (12மணி நேரம்)

அலகு-2 பாவலரேறு பெருஞ்சித்திரனார் பாடல்கள்
கண்ணதாசன் கவிதைகள்
இலக்கியவரலாறு (பக். 239- 300)
இலக்கணம் -வலிமிகும் இடங்கள் (14மணி நேரம்)

அலகு-3 சமூகக்கவிதைகள்
இலக்கியவரலாறு (பக்.300 -362)
சிறுகதை முதல் ஆறு சிறுகதைகள் (14மணி நேரம்)

அலகு-4 அரசியல் கவிதைகள்
இலக்கணம் - வலி மிகா இடங்கள் (10மணி நேரம்)

அலகு-5 மொழிபெயர்ப்புக்கவிதைகள்
சிறுகதை- 7முதல் 12 முடிய உள்ள சிறுகதைகள்
உரைநடை- 4முதல் 6 முடிய உள்ள கட்டுரைகள் (10மணி நேரம்)

பாடநூல்

1. பொதுத்தமிழ்- செய்யுள் திரட்டு- தமிழாய்வுத்துறை வெளியீடு-2017 -2020
2. சமூகவியல் நோக்கில் தமிழ் இலக்கியவரலாறு, தமிழாய்வுத்துறை வெளியீடு, தூயவளனார் கல்லூரி திருச்சிராப்பள்ளி-2
3. உரைநடை நூல் - தமிழாய்வுத்துறை வெளியீடு.
4. சிறுகதைத்தொகுப்பு : (நாட்டுடைமையாக்கப்பட்ட படைப்பாளர்களின் சிறுகதைகள்) , தமிழாய்வுத்துறை வெளியீடு.

SEM : I
17UGH110001

Hours/Week: 4
Credits: 3

HINDI PAPER – I

Assurance of Learning

- To enable the students to develop their effective communicative skills in Hindi.
- To introduce the socially relevant subjects in Modern Hindi Literature
- To appreciate the features of Modern Hindi Prose.

UNIT – I

8 hours

Dr Abdul Kalam, Ling Badaliye, Vachan Badaliye, Baathcheeth-Aspathal Mein

UNIT – II

12 hours

Hamara Rajchinha, Noun Ling, Kaarak Chinha, Chaar Baayee, Baathcheeth, Dookan Mein

UNIT – III

12 hours

Moun hee mantra hai, Vachan, Kaarak, Vishwamitra Ka yagna, Baathcheeth, Hotel mein

UNIT – IV

14 hours

Veer Shivaji, Pronoun, Danush Yagna, Baathcheeth-Maidaan mein

UNIT – V

14 hours

Rajatilak Kee Thaiyaree, Adjectives, Baathcheeth-Pareeksha ke baare mein

Books Recommended

1. Dakshina Bharathi Hindi Prachar Sabha, Thiagaraya Nagar, Chennai – 600 017, Subhodh Hindi Patamala-2, Bharath Milap, Bharath-1, 2016.
2. Ramdev, Vyakaran Pradeep, Hindi Bhavan, 63, Tagore Nagar, Allahabad 2, 2016.

FRANÇAIS – I

Assurance of Learning

- Introduire la langue et la culture française aux étudiants
- Comparer la culture de l'Inde et de la France
- Familiariser l'étudiant avec le vocabulaire, la grammaire et les conversations

UNIT I : A l'aéroport Kamaraj domestic de Chennai (10 heures)

Saluer, demander et dire le nom, présenter quelqu'un, se présenter, souhaiter la bienvenue a quelqu'un, demander et dire l'identité de quelqu'un.

Grammaire : Etre, s'appeler, pronoms sujets, interrogation

UNIT II : A l'Université (10 heures)

Demander comment on se porte, présenter quel qu'un, prendre congé, exprimer, l'appréciation.

Grammaire : Articles définis et indéfinis, genre des noms, adjectifs, présent de l'indicatif : verbes réguliers en er, être avoir, apprendre, prépositions a, en, au, aux.

UNIT III : Au café (10 heures)

Dire ce qu'on aime, donner des informations, exprimer l'admiration, demander des informations sur quelqu'un.

Grammaire : Adjectifs interrogatifs, présent de l'indicatif : avoir, verbes en er , savoir, qu'est ce que c'est?, adjectifs possessifs, négation ,adjectifs irréguliers

UNIT IV : A la plage (15 heures)

Proposer une sortie, accepter, refuser la proposition

Grammaire : phrases au singulier et au pluriel, pronom indéfini- on, il y a, adjectifs démonstratifs, négation, interrogation, présent de l'indicatif : faire, voir, aller, sortir, connaître

UNIT V : Un concert et chez Nalli (15 heures)

Inviter, accepter, exprimer son incapacité d'accepter, complimenter, parlé au téléphone, demander le prix, protester contre le prix.

Grammaire : Présent de l'indicatif : verbes en er, venir, pouvoir, vouloir, articles contracte, avec, a chez, le futur, interrogation est ce que, adverbes interrogatifs, adjectifs possessifs, accord de l'adjectif, adjectifs exclamatifs, très/trop, présent de l'indicatif : acheter-regarder, l'impératif.

Manuel :

1. K.Madanagobalane, **Synchronie-1**, Samhitâ Publication, 2011.

Livre de référence :

1. Annie Berthet /Batrix Sampsonis/ Catherine Hugot /Vronnique M Kizirian / Monique Waendendries, **Alter Ego A1**, Hachette, 2006.
2. Yves Loiseau/RégineMérieux, Connexions 1, Didier, 2011.

SEM : I
17UGS110001

Hours/week: 4
Credits: 3

SANSKRIT PAPER – I

Assurance of Learning

- To introduce Sanskrit Aksharas.
- To improvise the writing skills.
- To introduce Present tense forms

UNIT – I

8 hours

Akharavivaranam – Svaras & Vyanjanaani – Samyukta Aksharani.

UNIT –II **12 hours**

Shabdadayah – Aakaaraanta, ikaar aantah. ukaaraantah.
Shabdadayah – Aakaaraanta, iikaar aantah. uukaaraantah.

UNIT – III **12 hours**

Anuvaada Prayogah.

UNIT – IV **14 hours**

Lat Lakarh – Parasmai – Pada Prayogah = Vakyarupah.

UNIT – V **14 hours**

Subhaashitaani

Books Recommended

1. Kulapathy, K. M., Saral Sanskrit Balabodh, Bharathiya Vidya Bhavan, Munshimarg, Mumbai-400 007, 2014
2. R.S. Vadhyar & Sons, Book-Sellers and Publishers, Kalpathi, Palghat- 678003, Kerala, South India, Shabdha Manjari, 2014
3. Balasubramaniam R., Samskrita Akshara Siksha, Vangals Publication, 14th Main Road, JP Nagar, Bangalore -78, 2015.

Sem : I
17UGE120101

Hours/Week: 5
Credits: 3

GENERAL ENGLISH-I

Assurance of Learning

To help students

- use words and phrases related to self, home, friends and relatives in meaningful contexts
- develop positive self-esteem and thereby communicate confidently
- use language to perform basic functions like describing, clarifying, suggesting, and giving directions

Unit-I:

01. Personal Details
02. Positive Qualities
03. Listening to Positive Qualities
04. Relating and Grading Qualities
05. My Ambition
06. Abilities and Skills
07. Self-Improvement Word Grid
08. What am I doing?
09. What was I doing?
10. Unscramble the Past Actions
11. What did I do yesterday?

Unit-II:

12. Body Parts
13. Actions and Body Parts
14. Value of Life
15. Describing Self
16. Home Word Grid
17. Unscramble Building Types
18. Plural Form of Naming Words
19. Irregular Plural Forms
20. Plural Naming Words Practice
21. Whose Words?

Unit-III:

22. Plural Forms of Action Words
23. Present Positive Actions
24. Present Negative Actions
25. Un/Countable Naming Words
26. Recognition of Vowel Sounds
27. Indefinite Articles
28. Un/Countable Practice
29. Listen and Match the Visual
30. Letter Spell - Check
31. Drafting Letter

Unit-IV:

32. Friendship Word Grid
33. Friends' Details
34. Guess the Favourites
35. Guess Your Friend
36. Friends as Guests
37. Introducing Friends
38. What are We Doing?
39. What is (s)he / are they Doing?
40. Yes / No Question
41. What was s/he doing?
42. Names and Actions
43. True Friendship
44. Know your Friends
45. Giving Advice/Suggestions
46. Discussion on Friendship
47. My Best Friend

Unit-V:

48. Kinship Words
49. The Odd One Out
50. My Family Tree
51. Little Boy's Request
52. Occasions for Message
53. Words denoting Place
54. Words denoting Movement
55. Phrases for Giving Directions
56. Find the Destination
57. Giving Directions Practice
58. SMS Language
59. Converting SMS
60. Writing Short Messages
61. Sending SMS
62. The family debate
63. Family Today

Textbook

Joy, J.L. & Peter, F.M. *Let's Communicate 1*, New Delhi, Trinity Press, 2014. Print.

Extensive Reader

Dodd, E F. *Six Tales From Shakespeare*. London: Macmillan, 1987. Print. (First three tales)

SEM : I
17UCH 130201

Hours per week : 7
Credit : 6

GENERAL CHEMISTRY – I

Learning Assurance

- Students shall understand the Quantum Mechanical Concept and the structure of the atom.
- Students shall become aware of the periodic arrangement of elements in tabular form and the similarities and dissimilarities of properties
- Students will about the covalent bonding in organic molecules and the bonding related properties
- Students shall become aware of the Gases and their Physical properties
- Students shall learn about the qualitative analysis of various acid radicals and the volumetric analysis of amount of salts

Unit 1: Basic Quantum Chemistry (18hrs)

CGS and SI units – Basic, Derived and Subsidiary Units – Dimensional Analysis – Atomic Structure – Bohr Model – Sommerfield Model – Quantum Mechanical Theory and Atomic Spectra – Duality of Electrons - de Broglie Equation – Photoelectric Effect – Compton Effect – Davisson and Germer Experiment – Heisenberg's Uncertainty Principle – Schrodinger's Wave Equation – Eigen Values – Eigen Functions – Significance of Wave Functions – Radial and Angular Symmetry of Wave Functions – Shapes of Atomic Orbitals – Particle in a Box Model.

Unit 2: Periodic Table (18hrs)

Mendeleev's periodic classification – Modern Periodic Table – Grouping

of Elements in to s, p, d and f blocks – Periodic Properties and their variations – Atomic Radii and their functional forms – Determination of Ionic Radii by Pauling's Method – Slater's Rules – Screening Constant and Effective Nuclear Charge – Ionic Radii of isoelectronic ions – Ionization Energy – Factors influencing the IE – Electron Affinity – Electronegativity – Density – Melting and Boiling Points

Unit 3: Covalent Bonding (18hrs)

Covalent Bonding Concepts – LCAO and MO Theories – Concept of Hybridization – Types of Hybridizations – sp^3 , sp^2 and sp hybridizations with examples – Covalent Bond Properties – Bond Length, Bond Angle, Bond Polarity – Dipole moment – Electronic Effects: Inductive Effect, Mesomeric Effect, Electromeric Effect, Resonance Effect, Hyper conjugative Effect – Isomerism in Organic Molecules – Structural and Stereoisomerism with appropriate examples – Naming of Organic Molecules with one or two functional groups – IUPAC Nomenclature and Rules.

Unit 4: Gaseous State (18hrs)

Gaseous State – Kinetic Theory of Gases – Molecular Velocities – Root Mean Square, Average and Most Probable Velocities – Maxwell Law for Distribution of Molecular Speed – Collision Number – Mean Free Path - Fundamental Gas Laws - Universal Gas Equation – The Gas Constant (R) and its units in different forms – Deviation from Ideal Behaviour – van der Waals Equation for Real Gases – Critical Phenomenon – PV Isotherm for Real Gases – Critical Temperature – Critical Volume

Unit 5: Analytical Methods (18hrs)

Analytical Chemistry - Chemical Analysis - Types of Chemical Analysis – Qualitative and Quantitative Analysis – Qualitative Inorganic Analysis – Dry Test, Flame Test, Wet Test – Testing of Simple and Interfering Acid Radicals – Elimination of Interfering Acid Radicals – Identifying the Groups of Basic Radicals – Testing of the Basic Radicals belonging to different Groups - Volumetric Analysis – Principle – Standard Solutions – Normality and Molarity – Principles of Titrations – Theory of Indicators

- Types of Titrations – Acidimetry, Alkalimetry, Permanganometry, Dichrometry, Iodometry, Argentometry, Complexometry Error analysis: Accuracy – Precision – Error – Types of Errors – Mean – Median – Mode – Standard Deviation – Variance – Normal Distribution Curve

Text Books

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

Reference Books

1. Lee J D, *Concise Inorganic Chemistry*, (2006), Black Well Science, UK.
2. Morrison R T, Boyd R N and Batcharjee S K, *Organic Chemistry*, 7th Ed., (2009), Pearson New York
3. Peter Atkins and Julio De Paula, *Atkin's Physical Chemistry*, (2006), Oxford University Press, New Delhi.

SEM : I
17UCH130401

Hours/Week: 6
Credits: 5

ALLIED MATHEMATICS I FOR CHEMISTRY

Learning Assurances

- * Training the students in mastering the techniques of various branches of Mathematics.
- * Motivating the students to apply the techniques in their respective major subjects.
- * Introducing the basic knowledge of differentiation.
- * Understanding the concept of matrices and its applications.
- * Solving the problems in trigonometry.

UNIT - I

Partial fractions – Binomial series – Summation of series – Finding terms – Coefficient of x^n (simple problems only). (Chapter 1 – sec 1.1 – 1.2, pages: 1- 27).

UNIT - II

Exponential series – Summation – Logarithmic series – Summation.(Chapter 1 – sec 1.3, pages: 28 -48).

UNIT - III

Matrices – Rank of a matrix – Solving simultaneous linear equation in three unknowns using Elementary Operations method – Eigen values and Eigen vectors – Verification of Cayley Hamilton theorem. (Chapter 3- sec 3.2 – 3.4, pages: 137 – 160).

UNIT - IV

Higher Derivatives – Formation of equations involving derivatives – Applications of Leibnitz's theorem. (Chapter 6 – sec 6.1, pages: 266 – 281).

UNIT - V

Expansion of $\cos \theta$ and $\sin \theta$ – Powers of sines and cosines of θ in terms of functions of multiples of θ . (Chapter 5- sec 5.1 – 5.4, pages: 220 – 242).

Text Book

1. Ancillary Mathematics, Vol – I, 2009 Edition, S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay, Kandaswamy.
2. Engineering Mathematics-M.K.Venkatraman.
3. S.Narayanan and T.K.Manicavachagam Pillay, Trigonometry.

References

1. Ancillary Mathematics, Vol – II, 2009 Edition, S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay, Kandaswamy.
2. Ancillary Mathematics Book II: Narayanan, Manicavachagom Pillay.

ESSENTIALS OF HUMANITY

Assurance of Learning

- * To educate the students in the basic principles of value education and to inculcate the same values in them
- * To teach the students various dimensions of human personality and the ways to develop them.
- * To empower the students in gender sensitization, gender differences and gender roles.
- * To prepare the students for the smooth transfer from the stage of teenage to earlier adulthood.

Unit-I

Principles of Value Education - Introduction - Value Education- Characteristics of Values – Kinds of Values

Unit-II

Development of Human Personality - Personality traits - Theories of Personality - Discovering self- Defense mechanism - Power of positive thinking

Unit-III

Dimensions of Human Development - Physical development – Intellectual development - Emotional development - Social Development – Moral development - Spiritual development

Unit-IV

Responsible Parenthood - Human sexuality - Sex and love - Becoming a spouse - Responsible Parenthood

Unit-V

Gender Equality and Empowerment - Historical perspective - Education & economic development -Crimes against Women-Women’s rights

Text Book:

Essentials of Humanity, Department of Foundation course, St.Joseph’s College, Tiruchirappalli-2, 2016.