TRIPURA UNIVERSITY

(A Central University)
Suryamaninagar-799022

Syllabus
OF

Chemistry
(Major & General)

Semester – III

2014

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STRUCTUE OF SYLLABUS:

1. In each course/paper of 80 marks shall be 4 distinct units.
2. In each of paper/course of 40 marks there shall be 2 distinct units.

DURATION OF EXAMINATION:

1. For paper of 80 marks	3 hours	(General and Major)
2. For paper of 40 marks	2 hours	(General and Major)

QUESTION PATTERN:

A. Papers/Course having forty (40) marks:-

1. Three (3) questions will be set from each unit out of which two (2) questions of 10 marks each are to be answered.
2. Each question of ten (10) marks may be subdivided into 2 to 3 marks having maximum of 5 marks for a part.

B. Papers/Course having eighty (80) marks:-

1. Three (3) questions will be set from each unit out of which two (2) questions of 10 marks each are to be answered.
2. Each question of ten (10) marks may be subdivided into 2 to 3 marks having maximum of 5 marks for a part.

C. Papers/Course having sixty (60) marks:-

1. Out of sixty (60) marks twelve (12) marks will be for Internal Assessment.
2. Remaining forty-eight (48) marks are to be divided into 2 units each of which will comprise twenty four (24) marks
3. In each of the aforesaid unit there will be three (3) questions out of which two (2) questions of twelve (12) marks each are to be answered.
4. Each question of twelve (12) marks may be subdivided into 2 to 3 marks having maximum of 5 marks for a part.

D. There will be no MCQ type of questions in Honours papers and in case of General Courses the papers having practical component also there will be no MCQ type question.

B.Sc. SUBJECTWISE MARKS DISTRIBUTION

Semester	Paper	Marks	Semester	Paper	Marks
S1	C1P1	100	S2	C1P2	50+50(Pr)
	C2P1	100		C2P2	50+50(Pr)
	C3P1	100		C3P2	50+50(Pr)
	FNDC (English)	100		FN (MIL) +HAC	100
S3	C1P3	50+50(Pr)	S4	C1P4	50+50(Pr)
	C2P3	50+50(Pr)		C2P4	50+50(Pr)
	C3P3	50+50(Pr)		C3P4	50+50(Pr)
	EVS	100		Computer Skill	
S5	C1P5	50+50(Pr)	S6	Project	100
	C2P5	50+50(Pr)		NER Studies	100
	C3P5	50+50(Pr)		Entrepreneurship Development	100
	Constitution of India & Planning	100		Human Rights & Gender Studies	100

B.Sc. Honours

SEM-I	SEM-II	SEM-III	SEM-IV	SEM-V	SEM-VI
Eng	MIL	EVS	Computer	H5	H7
C1P1	C1P2	C1P3[50+50(Pr)]	C1P4[50+50(Pr)]	H6[00(Pr)]	H8[100(Pr)]
C2P1	C2P2	C2P3[50+50(Pr)]	C2P4[50+50(Pr)]	Constitution & Planning	Project
H1(100)	H2[60+40(Pr)]	H3[60+40(Pr)]	H4[60+40(Pr)]	C1P5 [50+50(Pr)]	Human Rights & Gender Studies
				C2P5 [50+50(Pr)]	

SEMESTER WISE MARKS DISTRIBUTION

Semester	General Programme	Major Programme
I	400	400
II	400	400
III	400	400
IV	400	400
V	400	500
VI	400	500
Total (I to VI)	**2400**	**2600**

B.Sc. Honours, Semester – III
Subject: Chemistry
Paper – H3, (A)
Marks:60 (48+12)

Unit-I: Inorganic Chemistry (Marks:24) 36 Lectures

Coordination Compounds: Werner's Coordination theory, coordination number, ligands and their classification, chelation, chelate effect and its applications; nomenclature of coordination compounds, isomerism in coordination compounds, stereoisomerism: geometrical and optical isomerism in 4- and 6-coordinate complexes; innermetallic complexes; stabilization of unusual oxidation states; Sidgwick's effective atomic number rule.

Bonding in transition metal complexes: Valence bond theory (VBT) and Crystal Field Theory (CFT) for octahedral, tetrahedral and square planer complexes; Explanation of magnetic properties, structures and colour of coordination complexes on the basis of the above theories; Nephelauxetic effect, elementary idea of adjusted crystal field theory (ACFT).

Magnetochemistry: Concept of diamagnetism, paramagnetism, ferromagnetism and antiferromagnetism, Origin of paramagnetic moment: electron spin moment and orbital angular moment, magnetic susceptibility and magnetic moment; magnetic susceptibility measurement by Gouy methods. Curie law, Curie-Weiss law, explanation of magnetic behaviour of $K_4[Fe(CN)_6]$, $K_3[Fe(CN)_6]$, $[Co(NH_3)_6]Cl_3$, $K_3[CoF_6]$, $K_2[Ni(CN)_4]$, $Ni(CO)_4$.

Unit-II: Physical Chemistry; (Marks:24); 36 Lectures

A. Thermodynamics and Kinetics (16 Lectures)

Thermodynamics

Thermodynamic systems- system, surroundings, various types of systems and processes isothermal, isobaric, isochoric processes, reversible, irreversible, adiabatic, cyclic etc. processes thermodynamic parameters, perfect and imperfect differentials; thermodynamic laws- zeroth law.

First law of Thermodynamics:
Statement, mathematical form, concept of enthalpy and heat capacity of gases, Cp and Cv, their interrelationships, Joule'sexperiment, Joule-Thompson effect, liquefaction of gases.

Thermochemistry: exothermic and endothermic reactions, enthalpy (heat) of formation, reaction, combustion, solution, neutralization, atomization, etc.; laws of thermochemistry, bond dissociation energy, Born-Haber cycle.

Chemical Kinetics:
Order and molecularity of reaction, rate of reaction, rate laws and rate equations, differential and integral forms of rate equation- zero order, first order and second order reactions, half life and average life, experimental methods for the determination of order of reactions, effect of temperature on the rate of reaction, Arrhenius equation, concept of activation energy, collision theory and transition state theory of reaction rates and their comparisons.

B. The Liquid State and Solution Properties: (12 Lectures)

The Liquid State:
Physical properties of liquids including their experimental methods of determination, internal pressure, vapour pressure, surface tension, viscosity, effect of temperature on these properties, structure of liquid and liquid crystals(elementary idea).

Solution Properties:

General features of solutions: Types of solutions, ideal and non- ideal solutions, modes of expression of composition of solutions - molarity, molality, normality, mole fraction and percentage, solutions of gases in liquids, Henry's law.

Properties of dilute solutions:
Extensive and intensive properties, additive, constitutive, and colligative properties, Raoult's law of relative lowering of vapour pressure, elevation of boiling point, depression of freezing point, osmosis- laws of osmosis, experimental methods of determination of properties of dilute solution- determination of molecular weight of substances based on these properties-their inter-relationships and their thermodynamic derivation, analogy between ideal gas and dilute solution , abnormal solution properties, van't Hoff factor.

C. Physical properties: (8 Lectures)

Additive and constitutive properties- molar volume at boiling point, parachor, rheochor, molar refraction, optical activity , specific and molar rotation-optical rotatory dispersion (ORD) and circular dichroism (CD), dielectric constant, molar polarization, induced and orientation polarizations, polar and non-polar molecule dipole moment-Clausius Mosotti equation, Debye equation, experimental methods for the determination of dipole moment, magnetic properties; paramagnetism, diamagnetism and ferromagnetism. Ascertaining structure of molecules using above properties.

B.Sc. Honours, Semester – III
Subject: Chemistry (Practical)
(Organic Chemistry)
Paper – H3, (B)
Marks: 40 (32+08)
Time: 6 hours

Experiment	=24
Practical Note Book	=03
Viva-Voce	=05

A. Organic qualitative analysis: Marks:32

Identification of a pure solid organic compound through detection of special elements (nitrogen, sulphur, halogens) and functional groups (phenolic-OH, -COOH, -CHO, >CO, $-NH_2$, $-NO_2$, $-CONH_2$, >C=C<). (Determination of mp, solubility test, detection of special elements, detection of functional groups, preparation of suitable derivative, determination of R_f value on TLC and survey of literature). No need to write detail analytical methods, observations instead total analytical data should be submitted in the given format to be supplied in the examination.

List of compounds to be identified: Adipic acid, Cinnamic acid, succinic acid, benzoic acid, salicylic acid, o-chlorobenzoic acid, benzamide, phthalimide, benzil, benzoin, p-nitro benzoic acid, 4-hydroxy benzoic acid, benzophenone, glucose, urea. Sulphanilic acid, p-nitroaniline, β-napthyl amine, resorcinol, β-napthol, hydroquinol, anthranilic acid, benzoic acid, p-nitrobenzoic acid, 4-hydroxy benzoic acid.

A. Internal Assessment: Marks:08

RECOMMENDED BOOKS

Organic Chemistry(Honours):

1. Organic Chemistry - I.L. Finar, Vol. I, 6th Edn. ELBS
2. Advanced Organic Chemistry - J. March
3. A guide to Organic Reaction Mechanism - P. Sykes, Orient Longman.
4. Organic Chemistry - R.T. Morrison & R.N. Boyd, Prentice – Hall.
5. Fundamentals of Organic Chemistry - Solomon
6. Organic Chemistry - Wade (Jr)
7. Stereochemistry of Carbon Compounds - E. Eliel.
8. Stereochemistry of Carbon Compounds - D. Nasipuri, John Wiley
9. Organic Spectroscopy - Y.R. Sharma
10. Organic Spectroscopy - W. Kemp
11. Organic Spectroscopy - P.S. Kalshi
12. Organic Reaction Mechanism - P.S. Kalsi
13. Organic Reaction mechanism - R.K. Bansal
14. Advanced Organic Organic hemistry - N.K. Visnoi
15. Advanced Practical Chemistry - R. Mukhopadhaya & P. Chatterjee.
16. Advanced Organic Chemistry – Miller
17. Organic Chemistry - Loudon

Inorganic Chemistry(Honours):

1. Basic Inorganic Chemistry - F.A. Cotton & G. Wilkinson & Gous
2. New concise Inorganic Chemistry - J.D. Lee
3. Inorganic Chemistry - Huheey, Keitar & Medhi
4. Selected topics in inorganic chemistry – Mallick, Tuli, Madan
5. Inorga nic Chemistry - Sharpe
6. Inorganic Chemistry - W.W. Porterfield
7. Introductio n to Modern Inorganic Chemitry - Mackay & Mackay
8. Elements of Bioinorganic Chemistry - G.N. Nukherjee & A. Das
9. Fundamental Concepts of Inorganic Chemistry-A.K. Das

Physical Chemistry(Honours):

1. Physical Chemistry - P.C. Rakshit
2. Physical Chemistry - P.W. Atkins
3. Physical Chemistry - G. W. Castellan
4. Physical Chemistry - S. Glastone
5. Physical Chemistry - Marron & Pruton/ Marron & Lando
6. Molecular Spectroscopy - Barrow

7. Molecular Spectroscopy - Banwell
8. Introductory Quantum Chemistry – A.K. Chandra, TATA McGraw Hill.
9. Quantum Chemistry – D.A. Mcquarrie, Viva Books, Pvt. Ltd.
10. Atomic Structure and Chemical Bonds – Manas Chandtra
12. Programming in Basic –S. Gottfired
13. Programming in Basic –Balaguruswamy.
14. Statistical Methods – N.G. Das
15.J.O'M, Bockris and A.K.N. Reddy, *Modern Electrochemistry*, Vol.1&2 (1998). Plenum Press, New York.
16.P.W. Atkins and R.S.Friedman, *Molecular Quantum Mechanics*, 3rd Ed.(1997) Oxford University Press.

17. K.J.Laidler, Chemical Kinetics, 3rd Ed.(1967), Harper and Row Publishers, New York

18.H.Eyring, S.H. Lin and S.M.Lin, *Chemical Kinetics*, (1999)Jhon Willey, New York.