

**DR. BABASAHEB AMBEDKAR MARATHWADA
UNIVERSITY, AURANGABAD.**

SYLLABUS

**B.Sc. (Chemistry)
FIRST YEAR
SEMESTER SYSTEM**

FIRST / SECOND SEMETER - 2009

[Effective from - June, 2009-10 onwards]

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGBAD
B.Sc. (Chemistry) IN SEMESTER PATTERN FOR THREE YEAR DEGREE

YEAR	SEMESTER	PAPER NUMBER	PAPER TITLE	CREDITS	MARKS
First	I	Paper - I	Inorganic Chemistry	3	50
		Paper - II	Organic Chemistry	3	50
		Paper - III	Lab Course I	1.5	50
		Paper - IV	Lab Course II	1.5	50
	II	Paper - V	Physical Chemistry	3	50
		Paper - VI	Inorganic Chemistry	3	50
		Paper - VII	Lab. Course - III	1.5	50
		Paper - VIII	Lab Course - IV	1.5	50
		Paper - IX	Organic Chemistry	3	50
Second	III	Paper - X	Physical Chemistry	3	50
		Paper - XI	Lab. Course V	1.5	50
		Paper - XII	Lab. Course VI	1.5	50
		Paper - XIII	Inorganic Chemistry	3	50
	IV	Paper - XIV	Physical Chemistry	3	50
		Paper - XV	Lab. Course VII	1.5	50
		Paper - XVI	Lab. Course VIII	1.5	50
		Paper - XVII	Physical Chemistry	3	50
		Paper - XVIII	Organic Chemistry	3	50
Third	V	Paper - XIX	Lab. Course IX	1.5	50
		Paper - XX	Lab. Course X	1.5	50
		Paper - XXI	Inorganic Chemistry	3	50
		Paper - XXII	Organic Chemistry	3	50
	VI	Paper - XXIII	Lab. Course XI	1.5	50
		Paper - XXIV	Lab. Course XII	1.5	50

	Note : For Theory Paper 1 Credit = 15 Periods and for practicals paper 1 Credit = 30 periods
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B.Sc. Chemistry
(Three year Degree Course)

<u>First Year</u>		<u>First Semester</u>
Paper I	Inorganic Chemistry	3 Credits (45 Hrs) 3 Hrs. / Week
I	Atomic Structure	15 Hrs.
II	Periodic Properties	10 Hrs.
III	S - Block Elements	10 Hrs.
IV	P - block Elements	10 Hrs.
Paper II	Organic Chemistry	3 Credits (45 Hrs) 3 Hrs / Week
I	Structure and Bonding	6 Hrs.
II	Mechanism of Organic reactions	8 Hrs.
III	Stereo - Chemistry	8 Hrs.
IV	Alkanes	6 Hrs.
V	Alkenes	6 Hrs.
VI	Arenes and Aromaticity	6 Hrs.
VII	Alkyl and Aryl Halides	5 Hrs.
Paper III	Lab Course I	1.5 Credits (45 Hrs.) 3 Hrs / Week
Paper IV	Lab Course II	1.5 Credits (45 Hrs.) 3 Hrs / Week

First Year**Second Semester**

Paper V	Physical Chemistry	3 Credits (45 Hrs) 3 Hrs. / Week
I	Mathematical Concepts	10 Hrs.
II	Gaseous State	06 Hrs.
III	Liquid State	06 Hrs.
IV	Solid State	06 Hrs.
V	Colloidal State	06 Hrs.
VI	Chemical Kinetics and Catalysis	11 Hrs.

Paper VI	Inorganic Chemistry	3 Credits (45 Hrs) 3 Hrs / Week
I	Chemistry of Noble gases	05 Hrs.
II	Chemical Bonding	20 Hrs.
III	Nuclear Chemistry	10 Hrs.
IV	Theory of volumetric analysis.	10 Hrs.

Paper VII	Lab Course III	1.5 Credits (45 Hrs.) 3 Hrs / Week
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Paper VIII	Lab Course IV	1.5 Credits (45 Hrs.) 3 Hrs / Week
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First Semester

Paper I	Inorganic Chemistry	3 Credits (45 Hrs) 3 Hrs. / Week
I	<u>Atomic Structure:</u>	15 Hrs.
	Atomic orbital's, Quantum numbers, Heisenberg uncertainty principle, shapes of s, p, d orbital's. Aufbau and Pauli exclusion principles. Hund's multiplicity rule. Electronic configurations of the elements, Bohr's atomic model (Qualitative aspect only).	
II	<u>Periodic Properties:</u>	10 Hrs.
	Atomic and Ionic radii, Ionization Energy, Electron affinity and Electro negativity. Trends in periodic table and application in predicting and explaining the chemical behavior.	
III	<u>S-Block Elements:</u>	10 Hrs.
	Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their functions in biosystems.	
IV	<u>P - Block Elements:</u>	10 Hrs.
	Comparative Study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides oxides of groups 13-16. Interhalogen compounds and its types.	

First Semester

Paper II

Organic Chemistry

3 Credits (45 Hrs)
3 Hrs. / Week

I. Structure and Bonding:

6 Hrs.

Localized and delocalized chemical bond; charge transfer complexes, resonance, hyper conjugation, inductive effect, hydrogen bonding, conjugative effect, steric effect.

II Mechanism of Organic Reactions:

8 Hrs.

Homolytic and heterolytic bond breaking. Types of reagents electrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates - carbocations, carbanions, free radicals (with two examples each) Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereo - chemical studies with two examples each)

III Stereochemistry of Organic Compounds :

8 Hrs.

- Concept of Isomerism - Types of isomerism
- Optical Isomerism - elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds.
- Relative and absolute configuration, sequence rules, D and L and R and S systems of nomenclature.
- Geometric Isomerism - Determination of configuration of geometric isomers. E and Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

IV Alkanes :

6 Hrs.

Methods of formation (Koble reaction, Corey - House reaction and decarboxylation of carboxylic acids)

Physical properties and Chemical reactions of alkanes

- V** **Alkenes** : **6 Hrs.**
Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes - mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration and oxidation with KMnO_4 . Polymerization of alkenes with one example each.
- VI** **Arenes and Aromaticity**: **6 Hrs.**
Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain structure of benzene : molecular formula and Kekule structure. Resonance Structure, MO Picture.
Aromaticity : The Huckel rule, aromatic ions
Aromatic electrophilic substitution: General Pattern of the mechanism (Nitration, halogenations and Sulphonation) and Friedel Crafts reaction.
- VII** **Alkyl and Aryl halides**: **5 Hrs.**
Polyhalogen Compounds: Chloroform, Carbon tetrachloride. Methods - formation of aryl halides, nuclear and side chain reaction.

First Semester

Paper III	Lab Course I	45 Hrs. 3 Hrs / Week
I	Volumetric Analysis :	15 Hrs.
	<ul style="list-style-type: none">• Calibration of Burette and Pipettee• Preparation of 0.1N. NaOH solution and its standardization by given oxalic acid solution.• Preparation of 0.1 N oxalic acid solution and its standardization by given KMNO_4 solution.	
II	Inorganic Qualitative Analysis :	30 Hrs.
	<ul style="list-style-type: none">• Identify two acid and two basic radical from the given binary mixture.	
	a] $\text{CdSO}_4 + \text{NH}_4\text{Cl}$	b] $\text{BaCO}_3 + \text{Al}_2(\text{NO}_3)_3$
	c] $\text{ZnCO}_3 + \text{KBr}$	d] $\text{MnCO}_3 + \text{MgSO}_4$
	e] $\text{NiSO}_4 + \text{MgCO}_3$	

First Semester

Paper IV	Lab Course II	1.5 Credits (45 Hrs.) 3 Hrs / Week
	<ul style="list-style-type: none">• Eudiometer : Determination of Equivalent weight of Mg• Viscometer : To Determine Viscosity of given liquid (Water / Ethanol) by viscometer• Staganometer : To determine surface tension of given liquid.	

- Chemical Kinetics :
 - * To study the effect of acid strength on the hydrolysis of an ester.
 - * To determine the specific reaction rate of the hydrolysis methyl / ethyl acetate catalyzed by hydrogen ions at room temperature.

First / Second Semester

Question Paper Pattern for Theory Paper - I, II, V, VI

Time : 2 Hrs.

Maximum Marks : 50

Note : All Questions are Compulsory

Q.1 Attempt any seven of the following ... 14 Marks
[(i) to (x)]

Q.2 Attempt any Two of the following ... 12 Marks
[(i) to (iv)]

Q.3 Attempt any Three of the following ... 12 Marks
[(i) to (iv)]

Q.4 Attempt any Three of the following ... 12 Marks
[(i) to (IV)]

First Semester

Question Paper Pattern for Practical

Lab. Course - I Paper - III

Time : 3 Hrs.
Max. Marks : 50

- Q.1 Calibration / Volumetric analysis ... 20 Marks
- Q.2 Inorganic Qualitative Analysis ... 20 Marks
- Q.3 Record Book and Viva - Voce ... 10 Marks

Lab. Course - II Paper - IV

Time : 3 Hrs.
Max. Marks: 50

- Q.1 Eudiometer / Viscometer / Staganometer ... 20 Marks
- Q.2 Kinetics (Hydrolysis) ... 20 Marks
- Q.3 Record Book and Viva - Voce ... 10 Marks

Second Semester

Question Paper Pattern for Practical

**Lab. Course - III
Paper - VII**

**Time : 3 Hrs.
Max. Marks : 50**

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|-----|-----------------------------|--------------|
| Q.1 | Estimation | ... 20 Marks |
| Q.2 | Inorganic Preparation | ... 20 Marks |
| Q.3 | Record Book and Viva - Voce | ... 10 Marks |

B.Sc. (Second Semester)

Question Paper Pattern for Practical

**Lab. Course - IV
Paper - VIII**

**Time : 3 Hrs.
Max. Marks : 50**

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|-----|---|--------------|
| Q.1 | Organic Qualitative Analysis (Single Component) | ... 20 Marks |
| Q.2 | Organic Estimation | ... 20 Marks |
| Q.3 | Record Book and Viva - Voce | ... 10 Marks |