DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.ACAD/NP/B.Sc.-Ist Yr./SEM.-I & II/157/2013

It is hereby notified for information of all concerned that, on the recommendations of the Boards of Studies, Ad-hoc Boards, and Faculty of Science, the Academic Council at its meeting held on 25-03-2013 has accepted the following revised syllabi for B.Sc. First Year progressively under the Faculty of Science :-

Sr. No.	Revised Syllabus	
[1]	B.Sc. [Physics]	Semester- I & II,
[2]	B.Sc. [Dairy Science & Technology]	Semester- I & II,
[3]	B.Sc. [Industrial Chemistry]	Semester- I & II,
[4]	B.Sc. [Geology]	Semester- I & II,
[5]	B.Sc. [Chemistry]	Semester- I & II,
[6]	B.Sc. [Botany]	Semester- I & II,
[7]	B.Sc. [Electronics] Science	Semester- I & II,
[8]	B.Sc. [Fisheries]	Semester- I & II,
[9]	B.Sc. [Microbiology]	Semester- I & II,
[10]	B.A. [Statistics]	Semester- I & II,
[11]	B.Sc. [Statistics]	Semester- I & II,
[12]	B.Sc. [Zoology]	Semester- I & II,
[13]	B.Sc. [Textile and Interior Decoration]	Semester- I & II,
[14]	B.Sc. [Home Science]	Semester- I & II,
[15]	B.A. / B.Sc. [Mathematics]	Semester- I & II.

This is effective from the Academic Year 2013-2014 and onwards.

These **syllabi are available on the University Website www.bamu.net**

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.ACAD/NP/B.Sc.-IST YEAR/
Sem-I & II/2013/5132-541
A.C.S.A.I.No.327[9].

Date:- 08-05-2013.

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Director,
Board of College and
University Development.

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Copy forwarded with compliments to :-

1] **The Principals, affiliated concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University.

2] The Director, University Network & Information Centre, UNIC, with **a request to upload the above all syllabi on University Website [www.bamu.net].**

Copy to :-

1] The Controller of Examinations,

2] The Superintendent, [B.Sc. Unit],

3] The Superintendent, [B.A. Unit],

4] The Superintendent, [Eligibility Unit],

5] The Programmer [Computer Unit-1] Examinations,

6] The Programmer [Computer Unit-2] Examinations,

7] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,
Dr. Babasaheb Ambedkar Marathwada University,

8] The Public Relation Officer,

9] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

-:**:-

S/-080513/-*

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

REVISED SYLLABUS

OF

B.Sc. (Chemistry)
FIRST YEAR
SEMESTER SYSTEM

FIRST & SECOND SEMESTER

[Effective from - June, 2013-14 onwards]

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGBAD

B.Sc. (Chemistry) IN SEMESTER PATTERN FOR THREE YEAR DEGREE

YEAR	SEMESTER	PAPER NUMBER	PAPER TITLE	Hours	MARKS
First	I	Paper - I	Inorganic Chemistry	45	50
		Paper - II	Organic Chemistry	45	50
		Paper - III	Lab Course I	45	50
	II	Paper – IV	Physical Chemistry	45	50
		Paper – V	Inorganic Chemistry	45	50
		Paper – VI	Lab. Course – II	45	50
Second	III	Paper – VII	Organic Chemistry	3	50
		Paper – VIII	Physical Chemistry	3	50
		Paper - IX	Lab. Course-III	3	100
	IV	Paper – X	Inorganic Chemistry	3	50
		Paper – XI	Physical Chemistry	3	50
		Paper – XII	Lab. Course-IV	3	100
Third	V	Paper - XIII	Physical Chemistry	3	50
		Paper – XIV	Organic Chemistry	3	50
		Paper – XV	Lab. Course-V	3	100
	VI	Paper – XVI	Inorganic Chemistry	3	50
		Paper – XVII	Organic Chemistry	3	50
		Paper – XVIII	Lab. Course-VI	3	100

	Note : For Theory Paper 1 Credit = 15 Periods and for practicals paper 1 Credit = 30 periods

B.Sc. Chemistry
(Three Year Degree Course)

First Year		**First Semester**
Paper I	**Inorganic Chemistry**	**(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**	**(45 Hrs)** **3 Hrs / Week**
I	Structure and Bonding	**06 Hrs.**
II	Mechanism of Organic reactions	**10 Hrs.**
III	Stereo - Chemistry	**10 Hrs.**
IV	Alkanes	**04 Hrs.**
V	Alkenes	**06 Hrs.**
VI	Arenes and Aromaticity	**05 Hrs.**
VII	Alkyl and Aryl Halides	**04 Hrs.**
Paper III	**Lab Course I**	**(45 Hrs.)** **3 Hrs / Week**

First Year		**Second Semester**
Paper-IV	**Physical Chemistry**	**(45 Hrs)** **3 Hrs. / Week**
I	Mathematical Concepts	**06 Hrs.**
II	Gaseous State	**08 Hrs.**
III	Liquid State	**06 Hrs.**
IV	Solid State	**07 Hrs.**
V	Colloidal State	**08 Hrs.**
VI	Chemical Kinetics and Catalysis	**10 Hrs.**
Paper-V	**Inorganic Chemistry**	**(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-VI	**Lab Course-II**	**(45 Hrs.)** **3 Hrs / Week**

First Semester

Paper I **Inorganic Chemistry** **(45 Hrs)**
3 Hrs. / Week

I **Atomic Structure:** **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 **Periodic Properties:** **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 **S-Block Elements:** **10 Hrs.**

Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their functions in biosystems.

IV **P - Block Elements:** **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** **(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:** **10 Hrs.**

Homolytic and heterolytic bond breaking. Types of reagents eletrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates - carbocations, carbanions, free radicals (with two examples each).

III **Stereochemistry of Organic Compounds :** **10 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 alicylic compounds.

IV **Alkanes :** **04 Hrs.**

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

Physical properties and Chemical reactions of alkanes

Chlorination, Nitration, Sulphonation, Catalytic oxidation.

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:** **5 Hrs.**

Nomeclature 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:** **4 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 : 10 Hrs.

- 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 : 15 Hrs.

- Identify two acid and two basic radical from the given binary mixture.

a] $CdSO_4 + NH_4Cl$ b] $BaCO_3 + Al_2 (NO_3)_3$

c] $ZnCO_3 + KBr$ d] $MnCO_3 + MgSO_4$

e] $NiSO_4 + MgCO_3$

III Physical Chemistry 20 Hrs.

- **Eudiometer : Determination of Equivalent weight of mg.**
  weight of mg.
- **Viscometer : To Determine Viscosity of given liquid (Water / Ethanol) by viscometer .**
- **Staglanometer: 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 methy1 / ethy1 acetate catalyzed by hydrogen ions at room temperature.**

Colorimeter :- Verification of Lambert-Beer's law using Spectrophotometer. [Colorimeter].

Second Semester

Paper-IV **Physical Chemistry** **(45 Hrs) 3 Hrs. / Week**

I **Mathematical Concepts :** **06 Hrs.**

Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of functions like k^x e^x, x^n, sin x, log x; maxima and minima, partial differentiation.

II **Gaseous States:** **08 Hrs.**

Postulates of kinetic theory of gases, kinetic gas equation, Deduction of Gas Laws : Boyles Law, Charles Law, Grahams Law of diffusion, Avogadro's hypothesis, deviation from ideal behavior, van der Waals equation of state. Critical Phenomena : PV isotherms of real gases.

III **Chemicals Kinetics and Catalysis:** **10 Hrs.**

Chemical Kinetics and its scope, rate of reaction, factors influencing the rate of reaction - concentration, temperature, pressure, solvent, light, catalyst concentration dependence of rates. Derivation of rate law and characteristics of simple chemical reactions - zero order, first order, second order, Pseudo order, half life. Effect of temperature on rate of reaction. Arrhenius equation, concept of activation energy.

Catalysis : Definition, types, and characteristics of catalysis, homogeneous, heterogeneous catalysis - Enzyme catalysis and its application.

IV **Liquid State:** **6 Hrs.**

Intermolecular forces, structure of liquids (a qualitative description).

Differnce between solids, liquids and gases.

Liquid Crystals: Classification, structure of nematic and cholestric phases.

V **Solid State :** **7 Hrs**

Types of solids, Amorphous, crystalline and difference between them, Miller Indices.

Laws of crystallography - (i) Law of constancy of interfacial angels (ii)Law of rationality of indices (iii) Law of symmetry. Symmetry elements in crystals. X-ray diffraction by crystals. Derivation of Bragg equation.

VI **Colloidal State :** **8 Hrs**

- Definition of colloids, classification of colloids.
- Solids in liquids (sols) : properties - kinetic, optical and electrical; stability of colloids, protective action. Hardy - Schulze Law.
- Liquids in liquids (emulsions) : types of emulsions, preparation.
- Liquids in Solids (gels) : classification, preparation and properties, general applications of colloids.

Second Semester

Paper-V **Inorganic Chemistry - II** **45 Hrs**
3 Hrs. / Week

I **Chemistry of noble gases :** **5 Hrs.**

Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

II **Chemical Bonding:** **20 Hrs.**

(A) Covalent Bond - Valence theory and its limitations, directional characteristic of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions, Valence shell electron pair repulsion (VSEPR) theory of NH_3, SF_4, CIF_3, ICI_2 and H_2O. MO theory, homonuclear (He, N_2 and O_2) and heteronuclear (CO and NO) diatomic molecules, bond strength and bond energy, percentage ionic character from dipole moment and electro negativity difference.

(B) Ionic Bonds - Definitions, Factors affecting ionic bond formation.

(C) Hydrogen bonding, Van-der-Waals forces, Metallic bond and its free electron concept.

III **Nuclear Chemistry:** **10 Hrs.**

Definition; Atomic number, mass number, Isotopes, Isobars mass defect and Binding Energy, Packing fraction N/Z ratio, Radio activity, properties of α, β and γ, Artificial transmutation. Applications with respect to trans-uranic elements, carbon dating.

IV **Theory of volumetric Analysis:** **10 Hrs.**

Types of titrations, volumetric apparatus, calibration of pipette and burette. Indicators used in pH - titrations, oxidizing agents used in titrations.
Theory of Internal, External and self indicators for redox titration.

Second Semester

Paper-VI

Lab Course-II **45 Hrs**
(3 Hrs. / Week)

I **Organic Qualitative Analysis:** **30 Hrs.**

Nature / Functional group / Element / Derivative / Physical constant

* Benzoic acid, * salicylic acid, * β-naphthol, * p-nitroaniline,

* Naphthalene, * Acetanilide.

II **Organic Estimation:** **15 Hrs.**

- Phenol by Bromination
- Estimation of basicity, molecular weight of organic acid (oxalic/acetic acid)

First Semester / Second Semester
Question Paper Pattern for Practical

Lab. Course-I+II Time : 06 Hrs.
Paper-III+VI Max. Marks : 100.

Q.1.	a]	Inorganic Volumetric Analysis.	... 10 Marks
	b]	Inorganic Qualitative Analysis.	... 20 Marks
Q.2.	a]	Organic Qualitative Analysis	... 20 Marks
	b]	Organic Estimation.	... 10 Marks
Q.3.	a]	Eudiometer / Viscometer / Staglanometer	... 15 Marks
	b]	Kinetics (Hydrolysis) / Spectrophtometer (Colorimeter)	... 15 Marks
Q.4.		Record Book and Viva-Voce	... 10 Marks.

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