DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.SU/Sci./B.Sc. Syll./31/2015

It is hereby notified for information to all the concerned that, on the recommendation of the various Board of Studies, Ad-hoc Boards & Committees the Hon'ble Vice-Chancellor has accepted the **revised semester-wise syllabi in the Faculty of Science as under** on behalf of the Academic Council under Section-14[7] of the Maharashtra Universities Act, 1994 :-

Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Automobile Technology IInd Year, [Three Year Degree Course].	III & IV
[2]	B.Sc. Horticulture IInd Year, [Optional].	III & IV
[3]	B.Sc. Chemistry IIIrd Year, [Optional].	V & VI
[4]	B.Sc. Analytical Chemistry IIIrd Year, [Optional].	V & VI
[5]	B.Sc. Agrochemical & Fertilizer IIIrd Year, [Optional].	V & VI
[6]	B.Sc. Geology IIIrd Year, [Optional].	V & VI
[7]	B.Voc. Multimedia & Animation, [Three Year Degree Course].	I to IV
[8]	B.Voc. [1] Industrial Automation, [2] Automobile & [3] Travel & Tourism, [Three Year Degree Course].	I to VI
[9]	B.Voc. Jewellery Design & Gemology, IInd Year [Three Year Degree Course].	III & IV
[10]	Diploma in Industrial Automation for Community College at University Campus.	

This is effective from the Academic Year 2015-16 & onwards as appended herewith.

All concerned are requested to note the contents of the 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/SU/SCI./
2015/6860-7259
Date:- 08-07-2015.

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Director,
Board of College and
University Development.

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Copy forwarded with compliments to:-

1] The Director, C.V.E.T., Dr. Babasaheb Ambedkar Marathwada University Campus, Aurangabad.

2] The Principals, affiliated concerned colleges,
Dr. Babasaheb Ambedkar Marathwada University

Copy to :-

1] The Controller of Examinations,
2] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter, Dr. Babasaheb Ambedkar Marathwada University,
3] The Superintendent, [B.Sc. Unit],
4] The Superintendent, [B.C.S. Unit],
5] The Programmer [Computer Unit-1] Examinations,
6] The Programmer [Computer Unit-2] Examinations,
7] The Record Keeper.
Dr. Babasaheb Ambedkar Marathwada University.

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DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

Syllabus of

B.Sc. III Year

Analytical Chemistry

Semester – V & VI

{Effective from 2015-16 & onwards}

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Syllabus : B.Sc. Analytical Chemistry Course Structure in Semester System.

B.Sc. Third Year

Semester	Course Code	Paper No.	Title of the Paper	Credit	Marks
V	ACH 501	XV	Modern Techniques in Analysis	03	50
	ACH 502	XVI	Industrial, Microbiological & Biochemical Analysis	03	50
	ACH 503	XVII	Laboratory Course VII	1.5	50
	ACH 504	XVIII	Laboratory Course VIII	1.5	50
VI	ACH 601	XIX	Applied Analytical Chemistry – I	03	50
	ACH 602	XX	Applied Analytical Chemistry-II	03	50
	ACH 603	XXI	Laboratory Course IX	1.5	50
	ACH 604	XXII	Laboratory Course X	1.5	50

Note : For theory paper one credit = 15 periods &

for Practical one credit =30 periods.

B.Sc. III year

Course Code ACH-501

Paper No. XV

Modern Technique in Analysis

Modern Techniques:-

1) ***I.R.-Spectroscopy***

Modes of vibrations, requirement of IR-radiations, Instrumentation-Radiant energy sources, wavelength selectors, detection devices, Outline of single beam and double beam IR-Spectrophotometer. Applications of IR-Spectroscopy,
Numerical problems on calculations of number of vibrations and frequency of vibration and identification of compounds.

2) *NMR-Spectroscopy:-*

Theory of NMR, Instrumentation, chemical shift, factors affecting chemical shift, spin-spin coupling, coupling constant and factors affecting it, NMR signals equivalent and non equivalent protons, Interpretation of NMR spectra of simple compounds, applications of NMR and limitations of NMR,
Numerical problems based on NMR.

3) *Mass spectroscopy*

Theory, components of mass spectrometer, inlet system Ion source accelerating system magnetic field ion separator, ion collector, vaccum system, types of ions produced rules of interpretation of mass spectra.

4) *Fluorescence spectroscopy*

Introduction, theory of fluorescence comparison between absorption fluorescence spectroscopy, advantages and their limitations, factors affecting fluorescence intensity, single beam and double beam spectro fluorometers, applications.

Course Code ACH-502

Paper No.XVI

Industrial Microbiological & Biochemical Analysis

1. *Industrial Analysis*

a) Paints : Definition, constituents and their functions, flash point of paint, separation of pigments, binder and thinner analysis of vehicle and thinner.

b) Pigments: General outline of identifications and analysis of pigments organic and inorganic pigments, their qualitative chemical test, analysis of white and tinted pigments.

c) Pesticides: Definition and classification of pesticides, analysis of the following in outline, DDT, Malathione, Diagionon.

d) Analysis of alloys: Composition and estimation of main constituents in the following stainless steel, brass, solder and gun metal.

2) Microbiological analysis:

Microscopy principle working, components used, and care of dissecting Bright fill.

Spectroscopy, calibration of ocular micrometer, measurements of cell bacterial by counting chamber, by plate count and by spectrophotometer. Preparation of bacterial and blood smear staining of bacteria, negative staining and grams staining, sterilization techniques, moist heat, dry heat, ultraviolet radiations, chemical methods, filter paper, disc method, alcohol effectiveness and phenol isolation of fungi and VAM from soil (any one method), isolation and identification of bacteria, measurements of growth of microorganisms, factors affecting growth of microorganism, pH, media, temperature, relative humidity and osmotic pressure.

3. <u>Biochemical analysis:-</u>

a) Protein : Definition classification, determination of net protein utilization, digestibility and biological value, estimation of protein by Lowry's method, Bradford method, estimation of total free amino acid, lysine and tryptophan.

b) Carbohydrates: Definition , classification, colour reactions of carbohydrates- Moloch's test, iodine test, Fehling test and Benedict test,determination of total carbohydrate by Anthrone, Amylase by iodine, fructose pectic substances by colorimetry.

c) Nucleic Acid: Definition, isolation and estimation of DNA & RNA

d) Vitamins :Definition and physiological activity of vitamins, estimation of thioamine, riboflavin, Niacin, carotene, cyanocobalamine.

Course Code ACH 503

Paper No.XVII

Laboratory course VII

1. Estimation of Na and K by flame photo meter in the given sample.
2. Estimation of Na and K in blood serum by flame photometer.
3. Turbidimetric determination of traces of chloride and sulphate.
4. Estimation of Bi and Pb EDTA using Xylenol orange indicator.
5. Estimation of chromium colorimetrically in stainless steel.
6. Analysis of solder for its Pb and Sn content.
7. Estimation of protein by Biuret reagent colorimetrically.
8. Fluorimetric estimation of thiamine hydrochloride and quinine sulphate.
9. Assay of peppermint oil for total ester.
10. Assay of benzaldehyde in bitter almond oil.

Course Code ACH 504

Paper No. XVIII

Laboratory course – VIII

1. Colorimetric estimation of amino acids.
2. Colony characteristics and growth pattern of different microorganisms.
3. Isolation of bacteria using streak plate method.
4. Estimation of Iron in Iron ore- Volumetrically / gravimetrically / spectrophotometrically.
5. Estimation of aluminum in bauxite gravimetrically.
6. Estimation of Nitrite and Phosphate in water by colorimetry.
7. Determination of blood sugar by Follin Wu method.
8. Estimation of Cholesterol in egg / oil.
9. Analyse the given sample of Gunmetal.
10. Estimation of Chlorides present in water (Mohr's adsorption indicator)

Course Code ACH 601

Paper No.XIX

Applied Analytical Chemistry-I

1. Inorganic Analysis :

   Analysis of minerals and ores, principles of ore dressing, analysis of iron ore, manganese ore, bauxite ore, beryl ore and dolomite ore.

2 Analysis of cement & coal :

   Main constituents, composition and analysis of cement & coal

3 Analysis of fertilizers :

   Definition, classification and analysis of fertilizers. (For N.P.K. Content)

4 Environmental Analysis :

   a) Analysis of water- colour, Odour, pH, taste, conductivity, dissolved solids, hardness, DO, COD, BOD, chlorides, sulphates, nitrites and phosphates.

   b) Analysis of air- Sampling, particulate matter, gaseous pollutants-SO_x, NO_x, CO_x and organic pollutants.

   c) Analysis of effluents- Quantitative estimation of toxic metals like – Hg, Zn, Cd, Pb and As.

5. Acid Rain

   Introduction, Theories of acid rain, adverse effect of Acid rain, control of acid rain,

6. Analysis of soil :

   Introduction, Determination of soil moisture, Determination of pH by colorimetric method, Conductivity, total alkalinity, chlorides, sulphates, organic matter, Nitrogen, phosphorus, calcium, magnesium, sodium & potassium. Determination of salts in soils.

Course Code ACH 602

Paper No.XX

Applied Analytical Chemistry-II

1. Introduction to food analysis :

   Legislation, standard and nutrition. Sampling of food, general chemical methods of analysis. Determination of moisture, ash, titrable acidity, pH and Sodium chloride. Food adulteration, common food adultrants of main food stuffs. Detection of adultrants in some common food stuff like Beverages, milk & butter.

2. Analysis of food and food products:

   Composition and analysis of the following (any one suitable method)

   a) Milk – Specific gravity, total solid, fat, proteins, lactose, contaminants in milk (QAS, artificial colour and antibiotic).

   b) Butter- Sampling, water, salt, curd, lactose, fat, ash, titrable acidity, pH.

   c) Wheat flour- Moisture, ash, oil, fat, protein, fiber, acidity, starch and maltose.

   d) Meat- Sample preparation, assessment of spoilage of raw meat, total volatile nitrogen extract release voulume, free fatty acids of extractable fat, peroxide value of extractable fat, thiobarbituric value.

   e) Beverages- Alcohol contents.

   f) Tea- Moisture, ash, tannin and caffeine.

   g) Coca- Moisture, ash, fat and starch.

   h) Soft drink- Sampling, saccharin, benzoic acid and cyclamate.

   i) Honey- Moisture, HMF, Free acid, pH and carbohydrate.

3. Pharmaceutical analysis :

   Introduction of drugs, sources of drugs, difference between drug and medicine, Dangerous Drug & Nacrotic drug. Classification of drugs, introduction to Indian pharmacopoeia. Analysis of following drugs as per IP and BP (Monograms)- Amoxycillin, Analgin, Proponolol, Pilocarbine nitrate, Rifampicin, paracetamol, Nimuselide, Ranitidine. Limit tests for iron, mercury, copper, arsenic, chloride and sulphate, Assay of drugs.

4. Clinical chemistry or Analysis :

   Introduction, Composition of blood, blood component, collection and preservation of samples, storage of blood sample, anticoagulants and preservatives. Estimation of blood chlorides, serum calcium, sodium and potassium. Estimation of blood glucose, uric acid in serum, Total serum protein, serum creatinine .

Course Code ACH 603

Paper No.XXI

Laboratory course – IX

1. Determination of physical parameters of waste water: pH, colour, odour, Turbidity, Temperature, electrical conductivity.
2. Determination of dissolved oxygen in the given water sample.
3. Estimation of phosphorous in fertilizer.
4. Determination of calcium in cement sample. (Titrimetry)
5. Estimation of calcium and Magnesium in dolomite ore.
6. Determination of total MnO_2 in manganese ore.
7. Analysis of water for COD.
8. Colorimetric estimation of traces of nitrogen in the given water sample using Nessler's reagent.
9. Estimation of micronutrients like - Sn, Cu and Mn in soil.
10. Analysis of tea and coffee.
11. Determination of suspended, dissolved & total Solids from the given water sample.
12. Determination of sodium, calcium & Magnesium in soil.
13. Determination of total hardness of water sample.

Course Code ACH 604

Paper No.XXII

Laboratory course-X

1. Determination of chlorpromazine hydrochloride (practical pharma chem. Part I, Becket and Stenlake, page 170.)
2. Determination of Phenobarbitone. (Practical pharma chem.Part I, Becket and Stenlake, page 171.)
3. Colorimetric estimation of Rifampicin. (IP 1996)
4. Assay of Aspirin.
5. Assay of Isoniazid.
6. Assay of Ephedrine hydrochloride.
7. Estimation of specific gravity and total solids present in milk samples.
8. Estimation of lactose content of milk.
9. Determination of glucose in honey by wilstater's method.
10. Estimation of phosphoric acid present in soft drink.
11. Detection of added carbonates, bicarbonates and salicylic acid in milk.
12. Determination of random blood glucose level.

LIST OF REFERENCE BOOK

1. Analytical Chemistry by Gurudeep R chatwal. HPH

   (First Edition reprinted 2011)
2. Analytical chemistry (Theory & practice) by-- R-M.Verma
   (Third Edition)
3. Analytical Chemistry by – B.K. Shavma (First Edition 2005)
4. Environmental chemistry by-- H.Kaur (A pragati Prakashan) Seventh

   Edition.
5. Environmental analysis by – A.K. Dey
6. Analysis of fertilizer by -Gill et al.
7. Inorganic analysis by - Gurudeep chatwal
8. Environmental analysis by- Kudesia
9. Environmental analysis by – Dr.Alka Gupta
10. Analytical Chemistry by – Gurudeep R. Chatwal (Himalaya Publishing House) Edition 2008-2011
11. Analytical Chemistry by – B.K. Sharma
12. Instrumental methods of Chemical analysis by – Chatwal Anand
13. Instrumental methods of Chemical analysis by – B.K. Sharma
14. Quality control methods of Fruits & vegetables by – Ranganna
15. Food Analysis by – Mayers
16. Pearson's methods of food Analysis

17. Pharmaceutical methods of Analysis by-- Stanley & Becket (Vol I & Vol II)

18. Monogram as per I P, B. P & U. S. P.

19. Analytical Chemistry principles 2nd edition 1990 by --Kennedy J. H.

20. Vogel's Textbook of Quantitative chemical Analysis (Fifth Edition) by – Jeffery, Bassett, Mendhan & Denney.

21. Standard Methods a Analysis by – APHA

22. Basic Concepts of Analytical Chemistry by – S. M. Khopkar

23. Metallurgical Analysis by – S. K. Jain

24. Spectroscopy by-- H. Kaur.

25. Spectroscopy pavia, Lampman, Kriz

26. Instrumental methods of Chemical Analysis by – Willard Merritt Dean & Settle second edition.

27. Principles of instrumental analysis by-- Holler sk009 & crouch

28. Principle of biochemistry by Lihninger.

29. Standards methods of Biochemical Analysis by-- Thimmaian.

30. Biophysical Chemistry by-- upadhyay & Nath.

31. Modern experimental biochemistry by -- Bobyer.

32. Standard methods of analysis by-- welcher volume 1, 2 & 3.

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