DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.ACAD/SU/Sci./B.Sc. & M.Sc. Syll./5/2015

It is hereby notified for information to all the concerned that, on the recommendation of the Faculty of Science the Academic Council at its meeting held on 30-05-2015 has accepted the **revised semester-wise syllabi as mentioned against their names in the Faculty of Science as under** :-

Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Computer Science Degree Course	III & IV
[2]	B.Sc. Information Technology Degree Course	III & IV
[3]	B.C.A. Science Degree Course	III & IV
[4]	B.Sc. Animation Degree Course	III & IV
[5]	B.Sc. Bioinformatics Degree Course	III & IV
[6]	B.Sc. Computer Science [Optional]	III & IV
[7]	B.Sc. Information Technology [Optional]	III & IV
[8]	B.Sc. Computer Applications [Optional]	III & IV
[9]	B.Sc. Computer Maintenance [Optional]	III & IV
[10]	B.Sc. Environmental Science [Optional]	V & VI
[11]	B.Sc. Bio-Chemistry [Optional]	V & VI
[12]	B.Sc. Forensic Science Degree Course	V & VI
[13]	B.Sc. Industrial Chemistry [Optional]	V & VI
[14]	B.Sc. Electronics [Optional]	V & VI
[15]	B.Sc. Zoology [Optional]	V & VI
[16]	B.Sc. Microbiology [Optional]	V & VI
[17]	B.Sc. Instrumentation Practice [Optional]	V & VI
[18]	B.Sc. Statistics [Optional]	V & VI
[19]	B.A. Statistics [Optional]	V & VI
[20]	B.A. / B.Sc. Mathematics [Optional]	V & VI
[21]	B.Sc. Home Science Degree Course	V & VI
[22]	B.Sc. Textile Interior Decoration Degree Course	V & VI
[23]	B.Sc. Fishery Science [Optional]	V & VI
[24]	B.Sc. Dairy Science & Technology [Optional]	V & VI
[25]	B.Sc. Botany [Optional]	V & VI
[26]	B.Sc. Physics [Optional]	V & VI
[27]	M.Sc. Computer Science	III & IV
[28]	M.Sc. I.T.	III & IV

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./
2015/3761-4160
Date:- 16-06-2015.

★
★
★
★
★
******

Director,
Board of College and
University Development.

..2..

:: 2 ::

Copy forwarded with compliments to:-

1] 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, [M.Sc. Unit],
5] The Programmer [Computer Unit-1] Examinations,
6] The Programmer [Computer Unit-2] Examinations,
7] The Record Keeper.

-=**=-

S*/-160615/-

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

Revised Syllabus of

B.Sc. [Industrial Chemistry]

(Optional)

Semester – V & VI

(Effective from 2015-16 & onwards)

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Revised Syllabus of B.Sc. V & VI Semester **Industrial Chemistry**
(Effective from the Academic Year 2015-2016)
i.e. Since June 2015 & onwards.

B.Sc. Industrial Chemistry
Three Year Degree Course (Semester Pattern) Year 2015-2016

Year	Paper	Course Name	Hours	Marks
B.Sc. Semester V	XIII	Unit Processes in Organic	45	50
B.Sc. Semester V	XIV	Process Equipment Design	45	50
B.Sc. Semester V	XV	Practicals	120	100
B.Sc. Semester VI	XVI	Unit Processes in Inorganic Synthesis & Industrial Safety	45	50
B.Sc. Semester VI	XVII	Process Instrumentation & Plant Utilities	45	50
B.Sc. Semester VI	XVIII	Design Thesis	120	100

B.Sc. Semester V- Industrial Chemistry

Paper XIII - Unit Processes in Organic Synthesis

Marks :50 Hours : 45

Unit Processes in Organic synthesis :

1. **Nitration:**
   Introduction, Nitrating Agents, Aromatic Nitration, Kinetics & Mechanism of Aromatic Nitration, Nitration of Paraffinic hydrocarbons, Nitrate Esters, N-Nitro Compounds, Process Equipment for Technical Nitration, Batch Nitration, Continuous Nitration, Mixed-acid compositions, DVS calculations, Typical Industrial Nitration Process- Preparation of Nitrobenzene, Preparation of m-dinitrobenzene
2. **Amination by Reduction:**
   Introduction & Defination, Methods of Reduction, Iron & Acid (Bechamp) Reduction-Reaction Mechanism, Chemical & Physical factors, Physical condition of Iron, Amount of water used, Amount of Acid used, Effect of Agitation, Reaction Temperature, Addition of Solvents, Yields of Amine. Equipment-Materials of Construction, Agitation, Jacketing of Reducers, Manufacturing of Aniline & Recovery of Aniline, Distillation of Aniline.
3. **Halogenation:**
   Introduction, Chlorination, Bromination, Fluorination, Iodination.
4. **Sulfonation & Sulfation:**
   Introduction, Sulfonating & Sulfating agents, Sulfonation of Aromatic compounds, Benzene & its derivatives, Naphthalene & its derivatives, Anthraquinone & its derivatives.
5. **Polymerization:**
   Introduction, Functionality, Polymerization Reactions, Polycondensation, Addition Polymerization, Free radical polymerization, Ionic Polymerization, Bulk Polymerization, Solution Polymerization, Emulsion Polymerization, Suspension Polymerization.

Reference Books:

1. Unit Processes in Organic Synthesis – P.H.Groggins
2. Chemical Procress- Shreve
3. Industrial Chemistry – B.K.Sharma
4. Polymer Chemistry- Gowarikar
5. Polymer Chemistry- Billmayer

B.Sc. Semester V - Industrial chemistry

Paper- XV Practicals on Organic Synthesis Marks: 100

Time: 3 Hours

List of Experiments

Experiments on Unit Processes

1. Preparation of P-nitroacetanilide from acetanilide & Calculate % Yield.
2. Preparation of m-dinitrobenzene from nitrobenzene & Calculate % Yield.
3. Preparation of tri-nitrophenol (picric acid) from Phenol & Calculate % Yield.
4. Preparation of P-nitroaniline from P-nitroacetanilide & Calculate % Yield.
5. Preparation of m-nitroaniline from aniline & Calculate % Yield.
6. Preparation of P-bromoaniline from Acetanilide & Calculate % Yield.
7. Preparation of P-Bromophenacyl bromide from P-bromoacetophenone & Calculate % Yield.
8. Preparation of P-Bromoacetanilide from Acetanilide & Calculate % Yield
9. Preparation of P-bromoaniline from p-bromoacetanilide & Calculate % Yield.
10. Preparation of 2,4,6-tribromoaniline from Aniline & Calculate % Yield.
11. Preparation of o-chlorobenzoic acid from anthranilic acid & Calculate % Yield.
12. Preparation of Sulphanilic acid from aniline & Calculate % Yield.
13. Preparation of Polystyrene by Bulk/Suspension/Emulsion Polymerization method & Calculate % Yield
14. Preparation of 6,6 and 6,10 thread by condensation & Calculate % Yield
15. Preparation of Novalac & Resole – Thermosetting resin & Calculate % Yield
16. Preparation of Urea formaldehyde resin & Calculate % Yield
17. Preparation of Polysulphide rubber(Thiokol) & Calculate % Yield

Ref Book-

Vogel's Textbook of Practical Organic Chemistry-Brain S.Furniss
Practicals in Organic Chemistry-Yadav

B.Sc. Semester V- Industrial Chemistry

Paper XIV - Process Equipment Design

Marks :50 Hours : 45

Process Equipment Design

1. **Distillation & Fractionating Equipment:**
   Introduction, Types of Column, Stresses in the column Shell, Determination of Shell thickness, Determination height "X', Allowable deflection, Column Internal details, Equillibrium stage column, Differential Column.
2. **Evaporation**- Introduction, types of evaporators-Equipments
3. **Crystallization**- Introduction, types of crystallization-Equipments
4. **Centrifugation**- Introduction, types of Centrifugation -Equipments
5. **Agitators:**
   Types of Agitators, Baffling.
6. **Reaction Vessel:**
   Introduction, Materials of Construction, Classification of Reaction Vessels, Heating Systems, Design Considerations.
7. **Corrosion:**
   Forms of Corrosion, Factors influencing corrosion, Factors preventing corrosion.

Reference Books:

1. Process Equipment Design- M.V.Joshi
2. Process Equipment Design- Mahajani &Joshi
3. Perry's Handbook of Engineering Chemistry

B.Sc. Semester VI- Industrial Chemistry

Paper XVI - Unit Processes in Inorganic Synthesis & Industrial Safety
Marks :50 Hours : 45

Unit Processes in Inorganic synthesis:

1. Industrial Process of Sulfur & Sulfuric acid
2. Nitrogen Industries: Ammonia, Nitric acid & Urea
3. Polymer Manufacturing Process:
    1. Polyethylene & Polypropylene
    2. Polyvinyl Chloride
    3. Phenol Formaldehyde
    4. Epoxy Polymers
    5. Butadiene-Styrene Copolymer.

Industrial Safety:

1. **Introduction-** Defination & terms used in context of safety, Accident-Non-reportable & reportable accidents, Hazard, Risk, Acceptance of risk, Responsibilities, Perception of Danger, Job Knowledge. Physical factors for Accidents- Accident ratio, Safety Training-Worker Training, Role of Supervisor in achieving a high standard of Safety, Supervisory Training Motivation for Safety-Safety Suggestion Scheme, Safety Committee, Safety Competition-Safety Contests, Safety Drives, Safety Exhibition & Poster.
2. **Fire & Explosion-** The Chemistry of Fire, Fire triangle, Classification of Fire, Stages of Fire, Causes of Industrial Fire-Electrical Equipment, Smoking, Mechanical Fault, Welding & Gas Cutting, Sparks, Explosives Dusts, Static spark, Runaway Chemical reaction, Fire Detection-Human Observation, Fire Alarm System, Fire Extinguishers-Fixed Fire fighting system. Portable fire Extinguishers-Soda acid type, Dry Chemical Powder type, Carbon dioxide type & Foam type Extinguisher.
3. **Personal Protective Equipment**-Hand Proctection, Foot Proctection, Head Proctection, Eye Proctection, Facce Proctection, Skin & Body Proctection, Protection against Fall, Noise Proctection, Respiratory Proctection-Care & Precaution, External air supply type & Self-Contained Breathing apparatus (SCBA), Selection of Personal protective equipment.

Reference Books

1Dryden's Outline of Chemical Technology-Gopal rao

2. Introduction to Industrial Safety-K.T.Kulkarni (2002) Or Concept & Practices in Industrial Safety- K.T.Kulkarni (2007)
3. Handbook of Fire Technology-Gupta R.S. Orient Longman Publication (1993)
4. Hazards in Chemical Units-Pandya C.L. (Oxford ISH -1991)

B.Sc. Semester VI- Industrial Chemistry

Paper XVII - Process Instrumentation & Plant Utilities

Marks :50 Hours : 45

Process Instrumentation

Temperature Measurement

1. Filled-Bulb & Glass-Stem Thermometers.
   a) Glass-Stem Thermometers
   b) Filled Thermal Systems
   c) Liquid-Filled System
   d) Vapor System
   e) Gas-Filled System
2. Bimetallic Thermometers
3. Resistance Temperature Detector (RTD's)
4. Radiation & Pyrometers

Pressure Measurement

1. Manometers-U tube , Well, Inclined & Micromanoters.
2. Bourdon & Helical pressures Sensors-
   C-bourdon Pressure Sensors
   Spiral Bourdon Pressure Sensors
   Helical bourdon Pressure Sensors
3. Bellows Type Pressure Sensors
   Motion Balance absolute Pressure
   Force Balance absolute Pressure
3. Diaphragm or Capsule type sensors
4. Pressure Gauges

Plant Utilities

1. Water-Sources of Water, Hard & Soft water, Causes of Hardness, Disadvantages of hard water, Methods of softening of water, Preboiling of water-Lime soda Process-Ion Exchange process. Essential characteristics of drinking water, purification of water-Screening, Sedimentation, Coagulation, Filteration. Treatment to Boiler Feed Water-Formation of Scale, Corrosion, Priming & Foaming, Caustic embrittlement.

2. Insulation-Introduction, Insulating Factors, properties of good insulator, Classification-Glass Wool Properties & application, Thermocole Properties & application, Cold Insulation, Low Temperature Insulation.

3. Steam & Steam Generator- Steam-Formation of Steam at constant Pressure, Enthalpy- Enthalpy of water, Enthalpy of Evaporation, Enthalpy of dry saturated steam, Wet Steam, Superheated Steam, Specific Volume of steam, Steam Generator- Classification, Factors for Boiler selection

4. Air- Compressed air, Fan air, Reciprocating Air Compressors, Multistage Compressors, Rotary Compressors.

Reference Books:

1. Process Instrumentation- Kirk & Remboy

2. Process Measurement & Analysis (Instrument Engineers' Handbook), Third Edn, (Butterworth Heinemann Publication) – Bela G. Liptak
3. Plant Utilities- D.B.Dhone (Nirali Prakashan)-D.B.Dhone

B.Sc. Semester VI- Industrial Chemistry

Paper XVIII - Design Thesis
Marks :100 Hours : 120

1. Submission of Design Thesis on technical Product	**40** Marks
2. Writing of Synopsis on Thesis Write brief information about History, Physical & Chemical Properties, raw materials, methods of production, Manufacturing process description, Flow sheet, Material balance & Uses	**20**
3. Industrial Visit & Submission of visit report	**20**
4. Viva-voce	**20**