

UNIVERSITY OF MUMBAI



Syllabus for Sem. V & VI

Program: B.Sc.

Course: HEAVY & FINE CHEMICALS

Applied Component

(Credit Based Semester and Grading System with
effect from the academic year 2013–2014)

T.Y.B.Sc.
Applied Component
HEAVY & FINE CHEMICALS Syllabus
Credit Based Semester and Grading System
To be implemented from the Academic year 2013-2014

SEMESTER V

Theory
USACHFC501

UNIT	TOPICS	CREDIT	L/WEEK
I	<p>1.1 <u>Introduction to Chemical Industry</u>. Explanation of the terms Heavy (Bulk) and Fine (Speciality) Chemicals. 2L</p> <p>1.2 <u>Silicates</u>: a) <u>Introduction to silicates</u>: Properties, structure and types of silicates. Preparation of sodium silicate. 4L b) Glass — Composition, types and application. 3L</p> <p>1.3 <u>Manufacture and applications of the following</u>:- a) Phosphorous oxychloride. 3L b) Sodium hydroxide 3L</p> <p>2.1: <u>Pumps for chemical work</u> a) Pumping equipment for liquids — piston pump, diaphragm pump, gear pump. Centrifugal pumps and submersible pumps.</p>		
II	<p>b) Vacuum systems oil sealed pumps, ejectors. 11L</p> <p>2.2 <u>Fertilizers: Preparation, properties and uses of</u> a) Normal superphosphate b) Triple Superphosphate c) Ammonium nitrate d) Ammonium Sulphate 4L</p>	2	4

<p style="text-align: center;">III</p>	<p>3.1 Brief idea about economic aspects of chemical manufacturing processes Location, Raw material, Energy, Capital, Manpower, Ecological aspects, Tax benefits. 4L</p> <p>3.2 Phase transfer catalysts: Introduction, mechanism of action, advantages and two examples 3L</p> <p>3.3 Brief account of perfumes,flavours and sweeteners:</p> <p>a)Perfumes— Introduction, classification (ethers, esters and essential oils) Composition, formation, blending and applications. Synthesis of α and β -ionone's from citral . 3L</p> <p>b)Flavours — Introduction Classification (natural and synthetic), applications Vanillin, coumarin (structures). Synthesis of vanillin. - 2L</p> <p>c)Sweetners:Introduction, classification with examples and structures of</p> <p>i) Natural sweetners :Carbohydrates(Glucose,Fructose) ii) Synthetic sweetners: i) Sucralose ii)Sulphonamide: eg Saccharin iii) Peptides: Synthesis of aspartame 3L</p>		
<p style="text-align: center;">IV</p>	<p>4.1: Industrial solvents:- Brief idea of green solvents. Uses of the following as solvents in industrial processes a) Acetone b) Ethyl acetate c) Isopropanol d) Toluene e) Dimethyl formamide 3L</p> <p>4.2 :Introduction to drugs: Terminology,Classification with one example each Synthesis and uses of :- 1)Ethambutol2)Mebendazole3)Benadryl 4)Ibuprofen 5)Miconidazole 6L</p> <p>4.3: Introduction to dyes: Dye, Chromophore(with example), Auxochrome(with example) Synthesis and uses of the following dyes:- 1) Indigo2)Alizarin3)Eriochrome black-T 4) <u>Auramine-O</u>5) Procion-red 6L</p>		

PRACTICALS

USACHFC5P1

1.1) Inorganic Preparation:

Preparation of Copper sulphate

1.2) Organic preparation

i) Preparation of a) Nerolin b) Cinnamic acid

2.1 Inorganic estimation

2.1.1 Estimation of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ in washing soda

2.1.2 Determination of thiosulphate content of a commercial hypo solution.

2.1.3 Estimation of available chlorine in the sample of bleaching powder

2.2 Organic estimation

2.2.1 Estimation of aspirin by iodometry.

2.2.2 Estimation of acetic acid in a sample of vinegar

3 Demonstration experiments

3.1) Steam distillation

3.2) Fractional distillation

SEMESTER VI			
Theory			
USACHFC601			
I	1.1 <u>Different Sources of Energy</u> Generation, Treatment of boiler feed water, Properties of steam, steam table. 3L		
	1.2 <u>Refrigeration:</u> System, media used for cold transfer (i.e. brine and other) 3L		
	1.3 <u>Manufacture and applications of the following:</u> - a) Hydrogen fluoride b) Nitric acid 4L c) Sodium dichromate d) Chromium trioxide 5L		
II	2.1 <u>Design of vessel</u> :Classification of chemical reactors, pressure vessels for internal or external pressure, Maintenance, storage vessels for liquids and gases 4L	2	4
	2.2 <u>Manufacture and uses of Industrial gases:</u> Hydrogen and acetylene 2L		
	2.3 <u>Industrial preparation of Inorganic Fine chemicals:</u> KMnO ₄ , FeSO ₄ 2L		
	2.4. <u>Zeolites, Clay and Ion-exchange resin</u> 3L		
	2. 5. <u>Composite materials:</u> Introduction, Constitution of composition, Classification of composites, Particle Reinforced composites, Fibre reinforced composites, Structural composites or Layered composites, Applications of composite material. 4L		
III	3.1 <u>Small scale industry and R and D technology:</u> Need and scope of small scale industry, SSI rules and regulations, R and D, technology transfer, Role of R and D,		
	Functional structure of R and D unit, Research strategies and manufacturing interface, University —industry interface, Patents 5L		

	<p>3.2 <u>Agrochemicals</u> Classification with examples, Insect attractants and repellents, plant growth regulators. 8L</p> <p>3.3 <u>Manufacture of soaps</u>: Raw material, Preparation, properties and types of soaps 2L</p>		
IV	<p>4.1 <u>Manufacture of:</u> - Acetic acid, ethyl acetate , isopropyl alcohol 4L</p> <p>4.2 <u>Unit Operations</u> : Crystallisation, Filtration, Distillation, Drying. 8L</p> <p>4.3 <u>Fluoroaromatics:</u> Introduction, important reagents used for fluorination. Preparation of ortho-fluorotoluene and 3-chloro, 4-fluoro anilines. Application of Teflon 3L</p>		
	PRACTICALS		
	<p style="text-align: center;"><u>USACHFC6P1</u></p> <p>1.1) <u>Inorganic Preparation:</u> Preparation of Ferrous sulphate</p> <p>1.2) <u>Organic preparation</u> i) Preparation of Aspirin</p> <p>2.1 <u>Inorganic estimation</u> Determination of the amount of phosphoric acid in a given sample. (Students to prepare succinic acid solution for standardization).</p> <p>2.1.2. Determination of the amount of magnesium hydroxide in a commercial milk of magnesia.</p> <p>2.2 <u>Organic estimation</u> 2.2.1 Estimation of ascorbic acid in cola. 2.2.2 Estimation of ibuprofen in the given sample</p> <p>.3 <u>Demonstration experiments</u> Preparation of cold creams, vanishing cream and local analgesic</p>		

Practicals

USACHFC6P1

Modality of Assessment :

Theory Examination Pattern:

A) Internal Assessment - 40%

40 marks.

Theory

40 marks

Sr No	Evaluation type	Marks
1	One Assignments/Case study/Project	10
2	One class Test (multiple choice questions / objective)	20
3	Active participation in routine class instructional deliveries(case studies/ seminars//presentation)	05
4	Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.	05

B) External examination - 60 %

Semester End Theory Assessment - 60%

60 marks

- i. Duration - These examinations shall be of two hours duration.
- ii. Theory question paper pattern :-
 1. There shall be **five** questions each of **12** marks. On each unit there will be one question & fifth one will be based on all the four units .
 2. All questions shall be compulsory with internal choice within the questions. Each question will be of **24** marks with options.
 3. Questions may be sub divided into sub questions a, b, c & d only, each carrying **six** marks **OR** a, b, c, d,e & f only each carrying **four** marks and the allocation of marks depends on the weightage of the topic.

Practical Examination Pattern:

(A)Internal Examination:-

There will not be any internal examination/ evaluation for practicals.

(B) External (Semester end practical examination) :-

Sr.No.	Particulars	Marks
1.	Laboratory work	80
2.	Journal	10
3.	Viva	10

Assessment pattern for semester end / External practical examination of 80 marks shall be finalized in the workshop of the subject

Semester end practical examination in applied component shall be conducted by the concerned department of the Institute/ College at the end of each semester and the marks of the candidates are to be sent to the University in the prescribed format.

Semester V:

Practical examination will be held at the college / institution at the end of the semester.

The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head of the Department/ Co-ordinator of the department ; failing which the student will not be allowed to appear for the practical examination.

Semester VI

Practical examination will be held at the college / institution at the end of the semester. The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head of the Department/ Co-ordinator of the department ; failing which the student will not be allowed to appear for the practical examination.