

FR. Conceicao Rodrigues College Of Engineering

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

Department of Electronics Engineering

F.E. (Electronics) (semester-II) (2018-2019)

Subject: Applied Chemistry-II

Syllabus

Module	Contents	Hours
1	<p><u>Corrosion</u></p> <p>Introduction the concept of corrosion Types of corrosion: Dry and Wet Corrosion Galvanic and Concentration cell corrosion Pitting, Intergranular, Waterline corrosion and Stress corrosion, Concept of Passivity, Passivity in prevention of corrosion. Factors influencing rate of corrosion Methods to control Corrosion: Electrochemical methods and Chemical methods of prevention. Electrochemical Methods of preventing corrosion: Cathodic Protection and Anodic Protection: Cathodic protection by Impressed current method and sacrificial anode methods. Anodic Protection by electrochemical passivity. Chemical Methods of prevention by Metal Coating: Hot Dipping, Spraying, Cladding, Electroplating, basic principle and brief description of the method. Paints: Constituents of the paint, Role played by the various constituents.</p>	10
2	<p><u>Alloys</u></p> <p>Introduction to Alloys, Purpose/reasons for preparing different types of alloys.</p> <p>Types of alloys, Classification of alloys as Ferrous alloys and Non-ferrous alloys</p> <p>Composition Properties and uses of some selected alloys: Alloys of Aluminum: Duralumin, Magnalium Brasses: Commercial Brass, German Silver Bronzes: Gun Metal, High Phosphor Bronze Solders: Tinmann Solder, Woods Metal Powder Metallurgy: Advantages and purpose of powder metallurgy. Important steps involved in powder metallurgy: Methods of preparing fine metal powders. Binding, compaction: Methods of compaction, sintering. Manufacture of some important oxide and non-oxide ceramic powders</p>	09
3	<p><u>Fuels</u></p> <p>Introduction to fuels, Characteristics of a good fuel Classification of fuels into solid, liquid and gaseous fuel. Calculating calorific value of fuel by Dulong's formula. Calculation and Numerical for Gross Calorific value and Net Calorific value.</p>	12

	<p>Comparison of solid, liquid and gaseous fuels</p> <p>Solid Fuels: coal as example of solid fuel. Proximate analysis, Numerical on proximate analysis, Ultimate analysis and Numericals on ultimate analysis. Liquid fuels: Extraction of crude oil from earth's crust, separation of crude oil by fractional distillation, Refining of crude oil Process of fractionation and various fractions obtained their characteristics and their significance. Cracking: Thermal cracking: Liquid phase thermal cracking and Vapour phase thermal cracking. Catalytic cracking: Fixed bed catalytic cracking and moving bed catalytic cracking.</p> <p>Knocking of engine, Factors responsible for knocking, Quality of petrol on octane scales. Diesel engine- Quality of diesel on the basis of cetane value. Combustion: Numericals on combustion Preparation, properties of Bio-diesel Propellants: Characteristics of good propellant. Solid propellants.</p>	
4	<p style="text-align: center;"><u>Composite Materials and Adhesives</u></p> <p>Introduction, Characteristic properties of Composite Materials</p> <p>Constitution of Composite Materials, Concept of matrix and dispersed phase. Classification of composite materials on the basis of Dispersed phase. Fiber reinforced composites Adhesives: Types of Adhesives, Physical and chemical factors involved in adhesive action.</p>	10
5	<p style="text-align: center;"><u>Green Chemistry</u></p> <p>Introduction to Green chemistry, Goals of Green Chemistry Twelve principles of Green Chemistry, Description of Green chemistry principles with suitable examples. Calculations of Atom economy Synthesis of Adipic acid, Synthesis of Indigo. Industrial applications of Green Chemistry. Green solvents: Liquid crystals, Super Critical Liquid (SCL)</p>	04

Course Outcome

CO	CO Statement
CO 203.1	Your ability to identify different types of fuels .
CO 203.2	Your ability to understand different types of corrosion .
CO 203.3	Your ability to relate with different types of composite materials .
CO 203.4	Your ability study different types of alloys .
CO 203.5	Your ability to relate with principles of Green Chemistry.

Mapping CO to PO/PSO

Course Name	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	2													
CO2	2													
CO3	2													
CO4	2													
CO5	X													
CO6	X													

Justification

CO FE103. 1 FE103. 2 FE103.3 FE103.4 FE103.5	PO1 Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems
	PSO1: All COs are mapped to PSO1 because the graduates will be able to apply fundamental subjects to the Engineering domain.

CO Assessment Tools

	Direct Methods										Indirect Methods
	T-1	T-2	L-1	L-2	L-3	L-4	L-5	A1	A2	Uni. Exam	Course Exit Survey
CO1	20		20	20						40	100%
CO2		50								50	100%
CO3		50								50	100%
CO4		20			10	10	10	10		40	100%
CO5		30							30	40	100%

Assessment Plan

Subject: Applied Chemistry-II

Teaching and Marking Scheme

Course Code	Course Name	Teaching Scheme			Credits Assigned			Total
		Theory	Pract	Tutorial	Theory	TW	Tutorial	
FEC103	Applied Chemistry-II	3	1	-----	3	0.5		3.5

Examination and Marking Scheme

Course Code	Course Name	Internal Assessment			University Examination		Total
		UT-1	UT-2	Average	Theory	TW	
FEC103	Applied Chemistry-II	15M	15M	15M	60M	25M	100M

Internal Assessment:

Internal Assessment consists of two tests.

Test 1: an Institution level central test, is for 20 marks and is to be based on a minimum of 40% of the syllabus.

Test 2: It is also for 20 marks and is to be based on the remaining syllabus.

Internal Assessment Scheme

Course Code	Course Name:	Syllabus Covered	Topics Covered
FEC103	Applied Chemistry-II		
UT-1	15M	40%	Fuel +Alloys
UT-2	15M	60%	Remaining Topics

Term Work:

Course Code	Course Name	Attendance	Laboratory Work	Assignments	Total
FEC103	Applied Chemistry-II	5M	10M	10M	25M

Course Outcomes Target:

CO	CO Statement	CO Target
CO 203.1	Your ability to <u>identify</u> different types of fuels .	60% Students Scoring 60% of Marks
CO 203.2	Your ability to <u>understand</u> different types of corrosion .	60% Students Scoring 60% of Marks
CO 203.3	Your ability to <u>relate</u> with different types of composite materials .	60% Students Scoring 60% of Marks
CO 203.4	Your ability <u>study</u> different types of alloys .	60% Students Scoring 60% of Marks
CO 203.5	Your ability to <u>relate</u> with principles of Green Chemistry.	60% Students Scoring 60% of Marks

Target Range	CO Assigned
0.75 OR 75% and above	3
0.5 to 0.74 OR 50% to 74%	2
0.5 OR 50% and below	1

Lesson Plan:

Subject: Applied Chemistry (II)

Credits-3.5

Lesson Plan:

Branch: Electronics Engineering

Sr. No.	Topic Covered	Planned Date	Actual Date	Delivery Mechanisms
2	Module-2 FUELS			
2.1	Introduction Fuels, classification of the fuels Characteristics of good fuel.	01/01/19	01/01/19	Lecturing
2.2	Dulong's formula to calculate GCV and HCV of the fuel.	03/01/19	03/01/19	Lecturing
2.3	Solid Fuel: Coal as example of solid fuel, Types of coal and its classification.	04/01/19	04/01/19	Lecturing
2.4	Proximate analysis and Numericals based on them	07/01/19	07/01/19	Lecturing
2.5	Ultimate Analysis : Determination of C, H ,N, S	08/01/19	08/01/19	Lecturing
2.6	Numericals on Ultimate analysis	10/01/19	10/01/19	Lecturing
2.7	Liquid Fuels: Extraction of Crude oil, Fractions obtained their importance, their characteristics.	11/01/19	11/01/19	Lecturing
2.8	Petrol for four stroke engine, knocking of the engine, Octane value.	14/01/19	14/01/19	Lecturing
2.9	Cetane value for diesel engine, Power alcohol	17/01/19	17/01/19	Lecturing
2.10	Biodiesel, synthesis and its applications	18/01/19	18/01/19	Lecturing
2.11	Numericals on combustion	21/01/19	21/01/19	Lecturing
2.12	Additional problems on Combustion	24/01/19	24/01/19	Lecturing
3	Module-3 ALLOYS			
3.1	Introduction to Alloys and advantages of alloy formation. Classification of alloys into	25/01/19	25/01/19	Lecturing

	Ferrous and Non-Ferrous alloys.			
3.2	Non-ferrous alloys: Brasses, Bronzes, Solders Alloys of Aluminium.	28/01/19	28/01/19	Lecturing
3.3	Ferrous alloys: Plain Carbon steel, Effects of various elements on the properties of plain carbon steel. Limitations of Plain Carbon Steel	31/01/19	31/01/19	Lecturing
3.4	Alloy Steels: Nichrome steel and stainless steel	01/02/19	01/02/19	Lecturing
3.5	Powder Metallurgy: Steps involved in preparation of powder metallurgy. Preparation of fine powders.	04/02/19	04/02/19	Lecturing
3.6	Compaction: Methods of compactions, Sintering of fine powders.	07/02/19	07/02/19	Lecturing
3.7	Ceramics: Introduction to Ceramics, Properties of a good ceramic material.	08/02/19	08/02/19	Lecturing
3.8	Synthesis and applications of some oxide and Carbide based ceramics e.g. Preparation of Alumina and Silicon Carbide.	11/02/19	11/02/19	Lecturing
1	Module-1 CORROSION			
1.1	Introduction to corrosion, Classification and types of corrosion.	12/02/19	14/02/19	Lecturing
1.2	Dry corrosion, oxidative corrosion and corrosion due to gases.	14/02/19	15/02/19	Lecturing
1.3	Wet corrosion: Galvanic corrosion, concentration cell corrosion	18/02/19	18/02/19	Lecturing
1.4	Factors affecting rate of corrosion	21/02/19	21/02/19	Lecturing
1.5	Methods to control corrosion: Overview	22/02/19	22/02/19	Lecturing
1.6	Cathodic protection: Impression current and sacrificial anode method.	25/02/19	25/02/19	Lecturing
1.7	Anodic protection	28/03/19	28/02/19	Lecturing
1.8	Protection by design	01/03/19	01/03/19	Lecturing
1.9	Metallic Coatings: Galvanizing and tinning Hot Dipping, Electroplating, Metal spraying, Cladding	04/03/19	07/03/19	Lecturing
1.10	Organic coatings: Paints, Enamels and	07/03/19	08/03/19	Lecturing

	Lacquers			
5	Module-5 GREEN CHEMISTRY			
5.1	Introduction to the concept of green Chemistry, 12 Principles of Green Chemistry.	08/03/19	11/03/19	Lecturing
5.2	Brief discussion on each principle with examples.	11/03/19	11/03/19	Lecturing
5.3	Brief discussion on each principle with examples. Contd.	14/03/19	14/03/19	Lecturing
5.4	Brief discussion on each principle with examples Contd.	15/03/19	15/03/19	Lecturing
5.5	Synthesis of Adipic acid and Indigo Dye. Introduction to green solvents such as Super critical solvents and Ionic Micelle solvents.	18/03/19	18/03/19	Lecturing
4	Module-4 COMPOSITE MATERIALS			
4.1	Introduction and classification of Composite materials. Introduction to concept of Matrix and Dispersed Phase.	22/03/19	22/03/19	Lecturing
4.2	Classification of Composite Materials into fiber and particle reinforced composites.	25/03/19	25/03/19	Lecturing
4.3	Detail accounts of various forms of particulate composites.	28/03/19	28/03/19	Lecturing
4.4	Various types of Fiber Reinforced Composites such as Glass reinforced, Carbon Fiber Reinforced etc.	29/03/19	29/03/19	Lecturing
4.5	Structural Composites: Laminates and Sandwiched Composites	01/04/19	01/04/19	Lecturing
4.6	Adhesives; Concept and Introduction, Various types of Adhesives,	04/04/19	04/04/19	Lecturing
4.7	Physical factors and chemical factors involved in adhesive action.	05/04/19	05/04/19	Lecturing
			40L	

Dr. Hemant Khanolkar
Faculty

Prof. Sundary Prabavarthy
Head, Department of Humanities and Science

Practical Plan

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
Fr. Agnel Ashram, Bandra, Mumbai 400 050
Department of Electronics Engineering
Academic Term: Jan-April 2017

F.E. SEMESTER II
APPLIED CHEMISTRY-II

Time Table (Practicals)	Day	Time
	Batch -A Tuesday	11.00 am-1.00pm
	Batch -B Wednesday	2.30pm -4.30pm
	Batch -C Thursday	1.30pm- 3.30pm

Teaching Scheme and Credits:

Course Code	Course Name	Teaching Scheme			Credits Assigned			Total
		Theory	Pract	Tutorial	Theory	TW	Tutorial	
FEC103	Applied Chemistry-II	3	1	-----	3	0.5		3.5

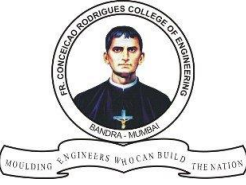
Examination and Marking Scheme

Course Code	Course Name	Internal Assessment			University Examination		Total
		UT-1	UT-2	Average	Theory	TW	
FEC103	Applied Chemistry-II	15M	15M	15M	60M	25M	100M

Laboratory Course in Applied Chemistry-II	
List of Experiments	
Sr. No	(Prescribed by University of Mumbai in its R-2016 revision of the syllabus)
1.	To determine percentage of Iron in the given sample of Plain Carbon Steel
2.	To determine percentage of Copper in the given sample of Brass
3.	To determine percentage of Tin in the given sample of Stannous Chloride dihydrate
4.	To determine percentage of Moisture and Ash in the given sample of coal.
5.	To carry out Flue Gas Analysis by Orsat's method.
6.	To determine percentage of Zinc in the given sample ore by complexo metric titration
7.	To determine percentage of Nickel in the given sample by gravimetrically.
8.	To prepare Biodiesel from simple edible oil.
9.	To determine calorific value of given sample of fuel by Bomb Calorimeter
10.	To determine percentage of Aluminium in the given sample of ore.

Lesson Plan for Practical

Sr. No	Title of the Experiment	Batch	Planned Dates	Actual Dates
1	To determine percentage moisture from the given sample of coal.	A	29/01/19	29/01/19
		B	30/01/19	30/01/19
		C	31/01/19	31/01/19
2	To determine percentage ash from the given sample of coal.	A	12/02/18	26/02/19
		B	13/02/18	27/02/19
		C	14/02/18	28/02/19
3	To determine percentage of copper from the given sample of brass.	A	27/02/19	27/02/19
		B	28/02/19	28/02/19
		C	26/02/19	26/02/19
4	To determine percentage of Iron from the given sample of plain carbon steel.	A	12/03/19	12/03/19
		B	13/03/19	13/03/19
		C	14/03/19	14/03/19
5	To determine amount of Tin from the given sample of stannous chloride dehydrate.	A	24/03/18	24/03/18
		B	25/03/18	25/03/18
		C	26/03/18	26/03/18

	COURSE:	FIRST YEAR ENGINEERING ALL BRANCHES/ BATCHES
	Semester:	SECOND [II]
	Subject:	APPLIED CHEMISTRY-II
	Academic Year:	2018-19
	DEPARTMENT OF HUMANITIES AND SCIENCE	

Text Books/ Reference Books:

List of the Books recommended as per Syllabus Scheme of University of Mumbai				
Sr.No.	Title of the Book	Author/s	Publishers	Remark
1.	Engineering Chemistry	Dara &Dara	S. Chand Publication	Available in Library
2.	Engineering Chemistry	Shahsi Chawala	Dhanpat Rai Publication	Available in Library
3	Engineering Chemistry	Jain and Jain	Dhanpat Rai Publication	Available in Library
4	Engineering Chemistry	B. Sivasankar	McGraw Hill	Available in Library
5	Engineering Chemistry	Raghupati Mukhopadyay	New Age Publication	Available in Library

Assignment Plan

Rubrics for evaluation	Out Of	Exceed Expectation (EE)	Meeting Expectation (ME)	Below Expectation (BE)
Knowledge	02	02	1.5	01
Writing	02	02	1.5	01
Completeness	02	02	1.5	01
Presentation	02	02	02	01
Timeline	02	02	02	01
TOTAL	10			

Sample Assignment Grading Sheet

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
Fr. Agnel Ashram, Bandra, Mumbai 400 050

Assignment Grading Sheet
F.E. SEMESTER- II
APPLIED CHEMISTRY-II

ASSIGNMENT -1

Title of Experiment	Alloys		
Module	SECOND		
CO attained	CO 203.4 To <u>study</u> different types of alloys.		
Name of Student			
Batch		Roll No.	
Date of Performance		Date of Submission	
Date of Correction		Academic Year	2018-19
Grade:		Module of Experiment	03/Alloys

Rubrics for evaluation	Out Of	Score
Knowledge/ Information	02	
Writing skills	02	
Completeness	02	
Presentation	02	
Timeline	02	
TOTAL	10	

Date & Signature of Teacher

Sample Experiment Grading Sheet

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
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Experiment Grading Sheet
F.E. SEMESTER- II
APPLIED CHEMISTRY-II

EXPERIMENT -1

Title of Experiment	DETERMINE PERCENTAGE OF MOISTURE IN THE GIVEN SAMPLE OF COAL		
Module	SECOND		
CO attained	CO 203.1 To <u>identify</u> different types of fuels.		
Name of Student			
Batch		Roll No.	
Date of Performance		Date of Submission	
Date of Correction		Academic Year	2018-19
Grade:		Module of Experiment	02/Fuels

Rubrics for evaluation	Out Of	Score
Awareness about Experiment	02	
Experimental Skills	02	
Neatness	02	
Documentation	02	
Timeline	02	
TOTAL	10	

Date & Signature of Teacher

Sample Course Exit Form

Serial Number

Fr.Conceicao Rodrigues College of Engineering

Course Exit Form

Roll Number: _____

Branch: FE- _____

Semester- II

Subject: **Applied Chemistry-II**

Academic Year: - 2018-2019

Name of the Student:

Course by: Dr. Hemant Khanolkar

Based on the knowledge and skills you attained from this course, how would you rate the following
(Please tick ✓)

Rate the achievement on the scale: [Where **1=Low** to **5 =High**]

Sr. No	Rating	1	2	3	4	5
1.	Teaching/Learning methods encouraged interactive participation					
2.	Overall environment in the class was conducive for learning.					
3.	CO 203.1 Your ability to <u>identify</u> different types of fuels .					
4.	CO 203.2 Your ability to <u>understand</u> different types of corrosion .					
5.	CO 203.3 Your ability to <u>relate</u> with different types of composite materials .					
6.	CO 203.4 Your ability <u>study</u> different types of alloys .					
7.	CO 203.5 Your ability to <u>relate</u> with principles of Green Chemistry.					
8.	Provisions of learning sources (Text books, Question Banks, and assignments) were supportive.					
9.	Assignments/Laboratory sessions were conducted on time.					

Any Comments/ Suggestions:
