Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total
FEC203	Engineering Chemistry-II	2	-	-	2	-	-	2

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract. /oral	Total
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)			
		Test1	Test 2	Avg.					
FEC203	Engineering Chemistry-II	15	15	15	60	2	--	--	75

Objectives

The concepts developed in this course will aid in quantification as well as understand the applications of several concepts in Chemistry that have been introduced at the 10 + 2 levels in schools.

Outcomes: Learners will be able to…

1. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
2. Illustrate the concept of emission spectroscopy and describe the phenomena of fluorescence and phosphorescence in relation to it.
3. Explain the concept of electrode potential and nernst theory and relate it to electrochemical cells.
4. Identify different types of corrosion and suggest control measures in industries.
5. Illustrate the principles of green chemistry and study environmental impact.
6. Explain the knowledge of determining the quality of fuel and quantify the oxygen required for combustion of fuel.

Module	Detailed Contents	Hrs.
01	**Principles of Spectroscopy:** Introduction: Principle of spectroscopy, Definition,Origin of spectrum, Classification of spectroscopy – atomic and molecular, selection rules. Table of relation between electromagnetic spectrum, types of spectroscopy and energy changes.	02
02	**Applications of Spectroscopy** Emission spectroscopy- Principle, Instrumentation and applications (Flame Photometry) Introduction to florescence and phosphorescence, Jablonski diagram, application of fluorescence in medicine only.	04
03	**Concept of Electrochemistry** Introduction, concept of electrode potential, Nernst equation, types of electrochemical cells, concept of standard electrode with examples, electrochemical series, simplenumericals.	02

04	**Corrosion:** Definition, Mechanism of Corrosion- (I) Dry or Chemical Corrosion-i) Due to oxygen ii)Due to other gases. (II)Wet or Electrochemical corrosion- Mechanism i) Evolution of hydrogen type ii) Absorption of oxygen. Types of Corrosion- Galvanic cell corrosion, Concentration cell corrosion (differential aeration principle), Pitting corrosion, Intergranular corrosion, Stress corrosion. Factors affecting the rate of corrosion- (i)Nature of metal, (ii)Nature of corroding environment. Methods of corrosion control- (I)Material selection and proper designing,(II) Cathodic protection- i) Sacrificial anodic protection ii) Impressed current method,(III) Metallic coatings- only Cathodic coating (tinning) and anodic coatings (Galvanising)	**06**
05	**Green Chemistry and Synthesis of drugs** Introduction – Definition, significance Twelve Principles of Green chemistry, numerical on atom economy, Conventional and green synthesis of Adipic acid, Indigo, Carbaryl, Ibuprofen, Benzimidazole, Benzyl alcohol, % atom economy and their numericals. Green fuel- Biodiesel.	**04**
06	**Fuels and Combustion** Definition, classification, characteristics of a good fuel, units of heat (no conversions). Calorific value- Definition, Gross or Higher calorific value & Net or lower calorific value, Dulong's formula & numerical for calculations of Gross and Net calorific values. Solid fuels- Analysis of coal- Proximate and Ultimate Analysis- numerical problems and significance. Liquid fuels- Petrol- Knocking, Octane number, Cetane number, Antiknocking agents, unleaded petrol, oxygenates (MTBE), catalytic converter. Combustion- Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid & gaseous fuels.	**06**

Assessment

Internal Assessment Test

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Examination

In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.

1. Question paper will comprise of 6 questions, each carrying 15 marks.
2. Question number 1 will be compulsory and based on maximum contents of the syllabus
3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module 3)
4. Total four questions need to be solved.

Recommended Books :

1. Engineering Chemistry - Jain & Jain, DhanpatRai
2. Engineering Chemistry – Dara & Dara, S Chand
3. Green Chemistry: A textbook – V.K.Ahluwalia, Alpha Science International
4. Fundamentals of Molecular Spectroscopy (4th Edition) - C.N.Banwell, Elaine M. McCash,
   Tata McGraw Hill.
5. Elementary Organic Spectroscopy- Y.R.Sharma, S.Chand and Co.
6. A Text Book of Engineering Chemistry - ShashiChawla, DhanpatRai
7. Engineering Chemistry – Payal Joshi &Shashank Deep (Oxford University Press)

The final certification and acceptance of TW ensures the satisfactory performance of laboratory work and minimum passing in the TW.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total
FEL202	Engineering Chemistry-II	-	01	-	-	-	0.5	0.5

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract. /oral	Total
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)			
		Test1	Test 2	Avg.					
FEL202	Engineering Chemistry-II	--	--	--	--	--	25	--	25

Outcomes: Learner will be able to…

1. Determine moisture and ash content of coal
2. Analyze flue gas
3. Determine saponification and acid value of oil
4. Determine flash point of a lubricating oil
5. Synthesize a drug and a biofuel.
6. Determine na/k and emf of cu-zn system

Suggested Experiments

1. Determination of Moisture content of coal.
2. Determination of Ash content of coal.
3. Flue gas analysis using Orsat's apparatus.
4. Saponification value of oil
5. Acid value of oil
6. Determination of Na/K by Flame photometry.
7. Preparation of Biodiesel from edible oil.
8. To estimate the emf of Cu-Zn system by Potentiometry.
9. Synthesis of Aspirin.
10. Determination of Flash point of a lubricant using Abel's apparatus

Term work:

Term Work shall consist of minimum five experiments.
The distribution of marks for term work shall be as follows:

- Laboratory work (Experiments and Journal) : **10 marks**
- Assignments and Viva on practicals : **10 marks**
- Attendance (Theory and Practical) : **05 marks**

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