ENGINEERING CHEMISTRY 2

Credits:
Theory = 2
Practical = 0.5

Exams:
Test 1 = 15m (1 hour)
Test 2 = 15m (1 hour)
End Sem = 60m (2 hours)
Term Work = 25m
Total = 100m

Modules:

1. *Principles of Spectroscopy [2]*
   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.

2. *Applications of Spectroscopy [4]*
   Emission spectroscopy- Principle, Instrumentation and applications (Flame Photometry)
   Introduction to florescence and phosphorescence, Jablonski diagram,
   application of fluorescence in medicine only.

3. *Concept of Electrochemistry [2]*
   Introduction,
   concept of electrode potential,
   Nernst equation,
   types of electrochemical cells,
   concept of standard electrode with examples,
   electrochemical series,
   Simple numericals.

4. *Corrosion [6]*
   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)

5. *Green Chemistry and Synthesis of drugs [4]*
   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.

6. *Fuels and Combustion [6]*
   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.

Term Work:
Laboratory Work: 10 marks
Assignment And Viva: 10 marks
Attendance (Theory and Tutorial): 05 marks

End Semester Examination:
1. Question paper will comprise 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

References:
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)