Annexure-I

NATIONAL INSTITUTE OF TECHNOLOGY PATNA

(An Institute under Ministry of HRD, Govt. of India)
Ashok Rajpath , PATNA -800005 (Bihar)

Department of Chemistry

Engineering Chemistry Course ForALL Engg. Branches(B.Tech.New Syllabus)2021

CHXXXX ENGINEERING CHEMISTRY L-T-P-Cr: 3-0-2-4

Unit - 1	**Fuels:**	**8 Lectures**
	Classification of fuels, Primary and secondary fuels, Calorific value of fuels,Determination of Calorific value by bomb calorimeter. Proximate and Ultimate analysis of coal, Significance of the constituents. Petroleum refining (fractionation). Knocking and its prevention. Analysis of flue gas. Green energy: Fuel cells, Solar cell, Bio-fuels.	
Unit - 2	**Electrochemistry and Redox reactions:**	**11 Lectures**
	Conductance, specific and equivalent conductivity, transport number, ionic mobility, Kohlrausch law. Application of conductance measurement, conductometric titration. Electrode Potential, Galvanic cell, Nernst equation, hydrogen, calomel and glass electrode, Galvanic Series. Redox reactions: Influence of complex formation, precipitation and change of pH on redox potentials. Formal potential, Redox titration and redox indicators (typical examples).	
Unit - 3	**Chemical Bonding and Coordination Chemistry:**	**11 Lectures**
	Covalent bonding. Valence bond theory, Bent's rule, VSEPR theory (typical examples). Molecular orbital theory, Linear Combination of Atomic Orbital (LCAO) method, Molecular orbital treatment for homo- and heteronuclear diatomics (B_2, C_2, O_2, CO, NO etc). Coordination chemistry: Werner's theory, Isomerism, Bonding in complexes. Valence Bond theory, Crystal field theory, crystal field effect in Tetrahedral, Octahedral, Square planar complexes. Application of crystal field theory.	
Unit - 4	**General Organic Chemistry:**	**12 Lectures**
	Aliphatic nucleophilic substitution reactions (S_N1, S_N2). Elimination reactions (E1, E2, E1*c*B) including discussion on regioselectivity (Saytzeff/Hofmann) and comparison between substitution and elimination.Addition to C=C (bromination, haloacid addition, ozonolysis, hydration, hydrogenation). Aromatic electrophilic substitution reactions (nitration, halogenation, sulphonation, Freidel Crafts' reaction, diazo coupling). Addition to C=O (Aldol condensation, Cannizzaro reaction, ester hydrolysis, Grignard reaction, imine formation).	

Texts:

1. S.Chawla,*A Textbook of Engineering Chemistry*, Dhanpati Rai Pubishing.
2. R. Sarkar, *General Chemistry Part-I*, New Central Book Agency.
3. J. E. Huheey, E. A. Keiter, R. L. Keiter, O. K. Mehdi, *Inorganic Chemistry, Principles of Structure and Reactivity*, 4th Ed., Pearson.

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4. P. Sykes, *A Guidebook to Mechanism in Organic Chemistry*, 6th Ed.,Pearson.

LABORATORY EXPERIMENTS

1. Proximate analysis of coal.
2. Determination of concentration of two acids in a mixture by conductometric titration.
3. Estimation of Cu (II) in given solution.
4. Estimation of Fe(II) in given solution.
5. Synthetic and spectroscopic characterization of Tris(acetyacetonato)Mn(III) complex.
6. Estimation of Ca(II) or Mg(II) in respective salts by EDTA method.
7. Preparation of 1-nitronaphthalene by nitration.
8. Preparation of *p*-iodonitrobenzene via diazotization.
9. Preparation of dibenzalacetone by aldol condensation reaction.
10. Alkaline hydrolysis of methyl benzoate to benzoic acid and monitoring by TLC.

Texts:

1. N.K. Sinha,*BScPractical Chemistry*, BhartiBhawan (P& D).
2. B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatchell, *Vogel's Textbook ofPractical Organic Chemistry*, 5th Ed., Pearson.

September14, 2021
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