रसायन विभाग
मोतीलाल नेहरु राष्ट्रीय प्रौद्योगिकी संस्थान इलाहाबाद, प्रयागराज-211004
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ANNEXURE-III

B.Tech. Ist/IInd Semester [Branch: Biotechnology & Chemical Engineering]

Course Name: Engineering Chemistry-III **Course Code:** CY11103**L:T:P :** 2:1:2 **Credit:** 04

1. **Chemical Bonding:**Drawbacks of VB theory, MO theory of small molecules, Bonding in metals semiconductors, insulators, impurity semiconductors, symmetry and group theory. [5]

2. **Water Chemistry:** Hard water & treatment processes, disinfection of water, boiler feed water &boiler corrosion, water effulents treatment (by natural & chemical processes) [5]

3. **Polymers:** Natural-carbohydrates, proteins. Synthetic-polyvinyls, polyamides, polyimides and others, characterization of polymers. [5]

4. **Green Chemistry:** Principles and examples. Case study for an integrated approach to green chemical industry. [3]

5. **Alicyclic and heterocyclic compounds:** Extraction/ synthesis processes. [2]

6. **Analytical Chemistry:** Uses of electroanalytical technique, reagents, analytical separation techniques- LC/GC/HPLC, characterization of heterogeneous catalyst. [4]

7. **Biochemical syntheses and processes:** Role of metal (Fe & Cu) ions in biological, heavy metal toxicity, some important bio-chemical syntheses and processes. [4]

Practical: List of Experiments

1. To determine the percentage of available chlorine in the supplied sample of bleaching powder.
2. To determine the alkalinity of the supplied water sample.
3. To determine the total, permanent hardness, Ca^{2+} and Mg^{2+} hardness in supplied water sample by titrating with standard EDTA solution.
4. Preparation of derivatives of the functional groups.
   (a) Preparation of acetanilide from aniline (Acetylation) and its spectroscopic characterisation.
   (b) Preparation of p-nitro acetanilide from acetanilide (Nitration)
   (c) Preperation of p-nitroaniline from p-nitro acetanilide.
5. Paper and thin layer chromatography
6. Estimation of essential biological metal ions by gravimetric methods.
7. Synthesis of Aspirin.

8. Determination of Dissolved Oxygen in water by Dissolved Oxygen Meter.
9. Determination of Partition Coefficient of iodine between CCl_4 and H_2O.
10. Extraction of chlorophiland its characterization by UV spectroscopy.

Text Books:

1. *Engineering Chemistry*, Jain & Jain, DhanpatRai Publishing Co., New Delhi.
2. *Engineering Chemistry*, ShashiChawla, DhanpatRai Publishing Co., New Delhi.

Reference Books:

1. *Biochemical Methods*, A. Pingoud, C. Urbanke, J. Hoggett, A. Jeltsch, Wiley-VCH Verlag
2. *Polymer Science*, V.R. Gowariker, N.V. Viswanathan, JayadevSreedhar, New Age International Private Limited, New Delhi.
3. *Inorganic Chemistry: Principles of Structure*, James E. Huheey, Ellen A. Keiter, Richard L. Keiter, Okhil K. Medhi, Pearson, New Delhi
4. *A Textbook of Analytical Chemistry*, Y. Anjaneyulu, K. Chandrasekhar, ValliManickam, Pharma Book Syndicate, Hyderabad.
5. *Elements of Physical Chemistry,* Peter Atkins, Julio D. Paula, Oxford, UK.
6. *Online resources.*