

Course Code. :	CH 224001
Course Title :	Chemistry of Engineering Materials
Credits:	L T P C 3 0 0 3
Prerequisites (if any)	Nil
Course Objective	<p>The course “Chemistry of Engineering materials” is designed to</p> <ul style="list-style-type: none"> ➤ To develop the fundamental understanding about Engineering materials ➤ To provide the knowledge about structural features, synthesis, properties of various categories of materials. ➤ To develop the skills for phase, microstructural and elemental characterisation of materials. ➤ To provide the knowledge about the role of chemistry in modern engineering applications and understand the working principle and study the applicability of the most important methods used in materials characterization.
Course Contents	<p>Unit I Introduction and classification of Engineering Materials: Structural features, synthesis, properties of Engineering Materials (metallic and non-metallic) like polymeric materials (e.g. thermoplastic and thermosetting), composite materials, glass-ceramic (e.g. silicates, metal oxides), cement and cementing materials, alloys.</p> <p>Introduction to nanomaterials, surface area to volume ratio and aspect ratio of nanomaterials, top-down and bottom up chemical/physical approaches for synthesis of nanomaterials. 20h</p> <p>Unit II Chemistry of Hydrocarbons: Origin of crude oil, basic building blocks, Major petrochemical processes & catalysts, Overview of refining process, Properties and General Characteristics of Hydrocarbon, Composition, Molecular types in Petroleum. Processing and Refining of crude oil:</p> <p>Classification of fuels; Determination of calorific values of solid fuels by bomb calorimeter – Manufacture of synthetic petrol by Fischer-Tropsch method – Knocking in IC engines – Octane and cetane rating of fuels; Petrol and Diesel Engine</p>

	<p style="text-align: right;">16h</p> <p>Unit III Chemistry of Lubricants and explosives: General characteristics of lubricants, mechanism of lubrication, Classification of lubricants, chemistry of lube oil and greases, Cutting fluids, Selection of lubricants, Properties of lubricants, Bio-lubricant, Origin, preparation and properties of explosives like lead azide, PETN, RDX etc.</p> <p style="text-align: right;">6 h</p>
Text books/ References	<p>TEXT/REFERENCE BOOKS</p> <ol style="list-style-type: none"> 1. An Introduction to Materials Science & Engineering, W.D. Callister, John Wiley & Sons (2007). 2. Fundamental of Ceramics, MW Barsoum, IOP publishing (2003). 3. Text book of Nanoscience and Nanotechnology, T. Pradeep, Mc. Graw Hill Education (2003). 4. Textbook of Nanoscience and Nanotechnology, Murty, Shankar, B Raj, Rath, Murday, Springer (2013). 5. Materials Science and Engineering, V. Raghavan, Prentice-Hall of India Private Limited (2003). 6. The Chemistry and Technology of Petroleum, J.G. Speight, 2014 CRC Press. 7. Hydrocarbon Chemistry, George A. Olah & Arpad Molnar, Wiley-Interscience, 2nd Edition May 2008. 8. Handbook of Petroleum Product Analysis, J.G. Speight, , 2nd Edition 2015. 9. The Properties of Petroleum Fluids, William D. McCain Penn Well Publication, 3rd Edition 2017. 10. James G. Speight, The Chemistry and Technology of Petroleum, CRC Press, New York 11. Jain and Jain, Engineering Chemistry, Dhanpat Rai Publication 12. Textbook of Engineering Chemistry, 4th Edition, R Gopalan, D Venkappayya, S Nagarajan, Vikas Publishing House 13. Engineering Materials: Polymers, Ceramics and Composites, 2nd Edition, A.K Bhargava, Prentice Hall India 14. Advanced Composites manufacturing, T.G. Gutowski, John Wiley and Sons, New York, 1997. 15. Mechanical Properties of Polymers and Composites, 2nd Edn., Lawrence E. Nielsen and Robert F. Landel Marcel Dekker, New York 1994.