

Entrance Test Syllabus for Ph. D. Admission in Petrochemical Engineering

Overview of Petrochemical Industry – The key growth area of India, Economics – Feed stock

Selections for Petrochemicals, Petroleum Geology and its scope, Origin, Formation and Composition of Petroleum (Origin and formation of Petroleum, Reserves and deposits of world, Indian Petroleum Industry, Composition of Petroleum, emphasis on both techniques and geochemistry), Hetroatoms and metallic trace impurities, Oil and gas traps.

Petroleum Crude Processing Technology: Origin – Exploration and production of petroleum – Types of crudes, crude composition – Characteristics and classification – Crude oil properties – Indigenous and imported crudes – Crude availability Vs demands, IS 1448: Standard – Testing of Petroleum crude – Products: Specifications and their Significance. Pretreatment of crude for Refining – Dehydration and desalting – Atmospheric distillation, Vacuum distillation of residue products – Types of trays, flow pattern in the trays – Reflux types and its significance.

Treatment techniques for vacuum distillates with different processes like solvent extraction –

Deasphalting, dewaxing, hydrofining, catalytic dewaxing and clay contact process – Production of lubricating oils.

Asphalt manufacture, Air blowing technology, Bitumen Types and their properties, Acid gas removal and sulphur removal techniques.

Petrochemical Process Technology -I : Manufacture of important paraffins ,olefins, acetylene, butadiene, isoprene, oligomers and aromatics : Techniques, Equipments, Reactions, Catalyst, Solvents, Operating conditions, Separation and purification and developments in these areas.

Production of synthesis gas: Various routes, reactions, mechanism ,condition, thermodynamics, kinetics, coal gasification and hydrogenation.

Conversion of - Ethylene to ethylene oxide, ethylene glycol, ethanol amine, Propylene to acrylic acid ,methyl ethyl ketone acrylonitrile; Hydration : Technologies for production of alcohols such as ethanol, isobutyl alcohol and higher alcohols; Esterification: Process for production of few esters such as acrylates, terephthalates ,ester for flavoring industries etc

Petroleum Refinery Engineering/ Petrochemical Engineering - II : Heating of crude oil through exchangers. Pipestill heaters, their types and constructional features, estimation of heat duty, combustion calculation and heat transfer area in different parts in pipe still heater.

Calculation of pressure drop and stack height, Flash distillation, Dew point and Bubble point calculations, temperature and concentration profile in a distillation column.

Vacuum distillation column internals and operational aspects for lubes, asphalt, cracking feedstock, Pressure distillation and gas fractionation units, Difference between various types distillation regarding products of pressure distillation.

Petrochemical Process Technology – II : Chlorination: Chlorination of paraffins, olefins and aromatic hydrocarbons, technologies involved in production of chloromethane, chloroethane, ethylenechlorides, vinyl chloride, chlorobenzene. Precaution and safety while handling chlorine and fluorine compounds; Nitration : Nitrobenzene, aniline, nitrotoluene, nitrochlorobenzenes

Polymerization: Principle and types, control and monitoring of polymerization processes
Technology for production of : Plastics: Polyethylene, Polypropylene, PVC; Resins – Phenol formaldehyde, Melamine formaldehyde; Rubbers: SBR, isoprene/neoprene; Fibres: Nylons and polyesters, acrylic fibres; Processing of polymers for making films, sheets, pipes, fibres etc by different techniques; Compounding of polymers- additives and modifiers.