Syllabus for M.S.(By Research) Programme

MCE111   Civil Engineering

MEE111   Electrical Engineering

MIC111   Electronics and Communication Engineering
Electronic Circuits, Semiconductor Devices, Integrated Circuits, Communication Theory

MIC121   Computer Science and Engineering

MIC122   Information Technology

MME111   Mechanical Engineering

MME122 Automobile / Automotive Engineering

alcohols, vegetable oils, biogas, natural gas, LPG and hydrogen as engine fuels. Methods of using all the fuels in SI and CI engines. Performance, emission and combustion behavior of the fuels in S.I. and CI engines.

MTE131 Biotechnology


Structural organization and multiplication of bacteria, viruses, algae and fungi, methods to quantify bacterial growth; Nutritional requirements of bacteria, host-microbe interactions; anti-bacterial, antifungal and anti-viral agents; mode of action and resistance to antibiotics; biofertilizers and biostimulants; microorganism and pollution control; biosensors.

Medium requirements for fermentation processes, medium optimization methods, Stoichiometry of cell growth and product formation, Kinetics of microbial growth, substrate utilization and product formation, Simple structured models, Batch, fed-batch and continuous processes, Mass transfer in bioreactor and Aeration and agitation, Rheology of fermentation fluid, Scale-up concepts.

Polarized light - optical rotation - circular dichroism, UV-VIS Spectroscopy - Applications, nuclear Magnetic Resonance - X-ray diffraction - application in Biology FT-IR, Raman spectroscopy, Theory of chromatography - normal phase & reverse phase chromatography - gel permeation- ion exchange & affinity chromatography

Biological Sequence Analysis, Local and Global Alignment Multiple sequence alignment and Application, Protein structure prediction, Phylogenetics, Biological databases.
MTE143 Pharmaceutical Technology

Unit 1 Biochemistry and microbiology

Cell components, structure and biochemical functions, membrane structure and functions, transport cell membrane, free energy, reduction potential, bioenergetics, electron transport chain, phosphorylation; Classification, physical, chemical properties and metabolism of – Carbohydrates, Lipids, Proteins and amino acids, Nucleic acids, biosynthesis, immunoglobulins. Nomenclature, classification, chemical nature, properties and function of – vitamins, hormones, coenzyme; classification of microbes, bacteriophages, media preparation, different media, growth curve, thermal death kinetics of microbes, sterilization, clinically important microorganisms of bacteria, viruses, fungi, identification and prevention, recombinant engineering – restriction enzymes, vectors, prokaryotic and eukaryotic host systems.

Unit 2 Enzymes and Biochemical Engineering

Enzyme classification, mechanisms, enzyme induction and inhibition, catalysis theories, entropy in catalysis, enzyme kinetics – single substrate reactions, Michaelis – Menten parameters, multi substrate reactions, enzyme immobilization, stoichiometry of cell growth and product formation, elemental balances, degrees of reduction of substrate and biomass, yield coefficients of biomass and product formation, energetic analysis of microbial growth and product formation, oxygen consumption, thermodynamic efficiency of growth, Modes of operation – batch, fed batch and continuous cultivation. kinetic models for microbial growth, Monod model, growth of filamentous organisms; Air Lift Reactor, Bubble Column Reactor, Immobilized enzyme reactors- packed bed, fluidized bed, membrane reactors

Unit 3 Pharmaceutical and analytical Chemistry

Molecular orbital theory and bonding, polar and non-polar bonds, resonance, intramolecular and intermolecular; Atomic and molecular spectra, electronic transitions, Beer and Lambert's law, Chromophores, Auxochromes, Spectral shifts, Solvent effect on absorption spectra, Principles of vibrational spectroscopy – Instrumentation and sampling technique – Applications in pharmaceutical sciences – NMR principles – Instrumentation – Applications, Thin Layer Chromatography Adsorbents, solvents, elutropic series, uses, limit test, TLC technique, High Performance Liquid Chromatography (HPLC), retention factor, symmetry factor, resolution, theoretical plate, Pharmacopoeial standards and applications – Melting point, boiling point, refractive index, titration curves – acid-base titration, nonaqueous and precipitation titration, iodimetry, iodometry; Argentimetric, redox, and titrations
Unit 4 Pharmaceutics and Formulation

Particle size, shape distribution and measurement, particle number, average particle size, number and weight distribution, sieving, sedimentation, determining surface area, permeability, adsorption, Powders – derived and flow properties, porosity, packing arrangement, densities, bulkiness. Liquid interface, surface and interfacial tension, surface free energy, measurement of surface and interfacial tensions, free energy, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB classification, surfactants, electrical properties of interface. Newtonian and non-Newtonian systems, thixotropy, viscosity and measurements, colloidal dispersions, suspensions and emulsions ,interfacial properties, Brownian movement, flocculation and rheological considerations, emulsions, complexation and protein binding, and drug action. Types of tablets, granulation, coating, hard and soft gelatin capsules characterization, formulation of parenteral products, Sustained release preparations, aerosol formulation.

Unit 5 Pharmacology and chemotherapy

Routes of administration, Pharmacokinetics, Pharmacodynamics, Receptors, Ionization, Drug distribution and pKa values, prodrugs; Classification, mechanism of action, structure activity relationship of various – sympathomimetic agents, adrenergic antagonists, antipsychotics, anticonvulsants, CNS stimulants, opioid analgesics, anti-anginal, vasodilators, calcium channel blockers and cardiac glycosides, anti arrhythmic and anti hypolipidemic agents eicosanoid drugs, antipyretics, anti-rheumatoid drugs and nonsteroidal anti-inflammatory drugs, Antacids, Adsorbents and protectives, Saline cathartics; Topical Agents – Protectives, Astringents, Anti-microbials topical agent. Chemotherapeutic agents (mechanism of action, structure activity relationship) – sulphonamides, penicillins and cephalosporins, chloramphenicol, macrolides, fluroquinolones, aminoglycosides and tetracyclines; Chemotherapy of tuberculosis, leprosy, fungal, viral diseases, malignancy and immunosuppressive agents

MME123 Manufacturing Engineering

Engineering Materials: Structure and properties of engineering materials and their applications; effect of strain, strain rate and temperature on mechanical properties of metals and alloys; heat treatment of metals and alloys, its influence on mechanical properties.

Applied Mechanics: Engineering mechanics – equivalent force systems, free body concepts, equations of equilibrium; strength of materials – stress, strain and their relationship, Mohr’s circle, deflection of beams, bending and shear stress, Euler’s theory of columns.
Metal Casting: Casting processes – types and applications; patterns – types and materials; allowances; moulds and cores – materials, making, and testing; casting techniques of cast iron, steels and nonferrous metals and alloys; solidification; design of casting, gating and risering; casting inspection, defects and remedies.

Tool Engineering: Jigs and fixtures – principles, applications, and design; press tools – configuration, design of die and punch; principles of forging die design.

Metal Forming: Stress-strain relations in elastic and plastic deformation; concept of flow stress, deformation mechanisms; hot and cold working – forging, rolling, extrusion, wire and tube drawing; sheet metal working processes such as blanking, piercing, bending, deep drawing, coining and embossing; analysis of rolling, forging, extrusion and wire /rod drawing; metal working defects.

Metal Joining Processes: Welding processes – manual metal arc, MIG, TIG, plasma arc, submerged arc, electroslag, thermit, resistance, forge, friction, and explosive welding; other joining processes – soldering, brazing, braze welding; inspection of welded joints, defects and remedies; introduction to advanced welding processes – ultrasonic, electron beam, laser beam; thermal cutting.

Machining and Machine Tool Operations: Basic machine tools; machining processes-turning, drilling, boring, milling, shaping, planing, gear cutting, thread production, broaching, grinding, lapping, honing, super finishing; mechanics of machining – geometry of cutting tools, chip formation, cutting forces and power requirements, Merchant’s analysis; selection of machining parameters; tool materials, tool wear and tool life, economics of machining, thermal aspects of machining, cutting fluids, machinability; principles and applications of nontraditional machining processes – USM, AJM, WJM, EDM and Wire cut EDM, LBM, EBM, PAM, CHM, ECM.

Metrology and Inspection: Limits, fits, and tolerances, interchangeability, selective assembly; linear and angular measurements by mechanical and optical methods, comparators; design of limit gauges; interferometry; measurement of straightness, flatness, roundness, squareness and symmetry; surface finish measurement; inspection of screw threads and gears; alignment testing of machine tools, Computer aided inspection.

Powder Metallurgy: Production of metal powders, compaction and sintering.

Manufacturing system modeling and Analysis: Operations research, Sources of errors in manufacturing; process capability; tolerance analysis in manufacturing and assembly; process
planning; parameter selection and comparison of production alternatives; time and cost analysis; manufacturing technologies – strategies and selection.

**Computer Integrated Manufacturing**: CAD, CAM, CAPP, CNC, DNC, Robotics, and CIM.

**Advances in Manufacturing**: Additive manufacturing, cellular manufacturing, FMS, JIT, Lean manufacturing, Agile Manufacturing

**MME124  Mechatronics**


- Image processing - Image Analysis - Machine Vision Applications. CNC and Automation Techniques: Mechatronic elements in CNC Machine tools - CNC measurement system and tooling - CNC programming

Syllabus for Ph.D. Programme

**PAP6011** Digital Architecture

**PAP6012** Landscape Architecture

**PAP6013** General Architecture

Evolution and principles of city planning; types of cities & new towns; planning regulations and building byelaws; eco-city concept; Concept of housing and neighborhood; housing standards, policies and typology, housing infrastructure; housing programs in India; self-help housing, settlement system planning; growth of cities & metropolises; rural-urban migration; urban conservation; urban renewal; Traffic and Transportation Planning. Indian architecture from Indus civilization to Modern contemporary period. European architecture from Egyptian modern architectural styles to contemporary period. Vernacular and traditional architecture. Principles of landscape design and site planning; history of landscape styles, elements and materials, plant characteristics, environmental considerations in landscape planning. Application of computers in architecture and planning; understanding elements of hardware and software; computer graphics; programming languages and usage of software packages. Components of Ecosystem and environment, climate responsive and energy efficient building design. Principles of Building Science - lighting, architectural acoustics etc. Building Services on Water supply, sewerage and drainage systems, electrification of buildings, air-conditioning intelligent buildings; fire fighting systems, building safety and security systems - principles, types, standards and uses; Infrastructure, Services and Amenities in city level planning. Behavioral characteristics of all types of building materials; principles of strength of materials; design of structural and principles of disaster resistant structures. Building Construction and Management: Building construction techniques, methods and details; professional practice; project management techniques. Development Administration and Management: Planning laws; development control and zoning regulations.

**PAP6021** Town and Country Planning

Process of evolution of human settlement planning - Planning systems in India - Type of planning surveys - Sociological and Economic concepts and frameworks - Social and economic Impacts of urban growth and expansion - City-region, urban sprawl, and urban fringe - Current trends in the traffic and transportation development sector in India. - Pedestrian planning - Parking and Public Transport Surveys - Inventory of Transport facilities - Different modes - Private transport - Scope and function of statistics in planning analysis - Distribution and structure of population - Population projection methods - Research processes and planning
processes - Access to Information: nature, types and sources - Hypothesis - Housing character and its information with reference to culture and technological changes and development - Impact of industrialization and urbanization on housing and built environment - Green house and eco friendly housing - Housing market and housing finance - Gated community - emergence and management system - Contemporary theories and concepts in city planning - Concept and need for regional planning and regional development - Multi-level planning, block and District planning. Environmental concerns at local, regional and global levels - environmental impact assessment practice in India - Sustainability and environmental - Legislative requirements, public awareness and community participation - Evolution, scope and significance of planning legislation - Review of Town and Country Planning Act of Tamil Nadu - Professional role responsibility and planning consultancy service - project cycle - Planning process and project planning - Funding options for urban development projects - Planning Norms and standards - Basic concepts of government and governance - Governance and urban governance - Urban and rural administration in developed, and developing countries - e-Governance-concepts, theories and practices - e-Readiness indices - Approaches to understanding organizations - Human resource planning and management - Participatory governance - Public relations - Introduction to real property ownership - Real estate investment analysis and portfolio management - Classification of spatial and non-spatial data application of spatial data in urban and regional plans - Ecotourism - Leisure, recreation and society - Tourist and local community - Tourist site planning - processes and sustainability - Urban development through Five Year Plans - Budgetary allocation from central and state governments for urban development - Asset management - Disaster cycle - Disaster-types, causes and consequences - Disaster preparedness and rehabilitation - Spatial planning and technology interface - Socio-economic and environmental Impact of techno cities - communities and people in building smart cities and smart communities - Information need and the role of web in planning - Web sites and information sources in urban and regional planning.

PCE1021  Structural Engineering
PCE1022  Computer Aided Structural Engineering
PCE1023  Computer Methods and Applications in Structural Engineering


**PCE1031**  Construction Engineering

**PCE1032**  Construction Engineering and Management

**PCE1033**  Infrastructure Engineering

**PCE1034**  Advanced Construction Technology

**PCE1035**  Architectural Construction


PCE1041 Soil Mechanics and Foundation Engineering
PCE1042 Geotechnical Engineering
PCE1043 Rock Engineering and Underground Structures
PCE1044 Environmental Geotechnology

and objectives, planning and exploration program, methods of exploration, exploration for preliminary and detailed design, spacing and depth of bores, data presentation. Geophysical exploration and interpretation, seismic and electrical methods.

**PCE1051 Environmental Engineering**


**PCE1061 Environmental Management**


**PCE1081 Water Resources Engineering**

**PCE1082 Irrigation Water Management**

- gender and IWRM - mainstreaming gender in water management - Techniques of data collection and reporting - participatory field research - methods of field research - RRA, PRA tools etc. - participatory tools - SPQR and statistical analysis.

**PCE1101**  Geoinformatics

**PCE1102**  Geomatics

**PCE1103**  Remote Sensing

**PSH7201**  Spatial Information Technology


**PEE3011**  Power Systems Engineering

**PEE3012**  Electrical and Electronics Engineering

**PEE3013**  Electrical Energy System

**PEE3021 High Voltage Engineering**


**PEE3031 Power Electronics and Drives**

**PEE3032 Electrical Machines**


**PEE3041 Embedded Systems Technology**


**PEE3051** Control System  
**PEE3052** Electronics and Control  
**PEE3053** Instrumentation Engineering  
**PEE3054** Sensor System Technology


**PIC4011** VLSI Design  
**PIC4012** Applied Electronics Engineering  
**PIC4013** Electronics and Communication Engineering


**PIC4021** Medical Electronics
**PIC4022  Biomedical Engineering**

Electronic Circuits, Semiconductor Devices, Integrated Circuits, Communication Theory Biomedical Instrumentation, Biomedical Equipment, Digital Image Processing, Radiological Equipment, Human Assist Devices

**PIC4031  Advanced Communication System**

**PIC4032  Digital Communication and Network Engineering**

**PIC4033  Optical Communication**

**PIC4034  Wireless Communication**

**PIC4035  Communication Systems**

**PIC4036  Networking Technology**

**PIC4037  Electronics Engineering**

**PIC4038  Computer and Communication**


**PIC4041  Computer Science and Engineering**

**PIC4042  Software Engineering**

**PIC4043  Information Technology**

**PIC4044  Distributed Computing System**

**PIC4045  Advanced Computing**

**PIC4046  Pervasive Computing**

**PIC4047  Main Frame Technology**

**PIC4048  System Engineering and Operations Research**


**PIC4051  Multimedia Technology**


PME2011  Mechanical Engineering
PME2012  CAD
PME2013  CAM
PME2014  Product Design and Development
PME2015  Machine Design
PME2016  Engineering Design
PME2017  Mechanical Systems

Design concepts: Design fundamentals, methods and material selection; Design for Quality; Failure mode effect analysis and design for six sigma; Design of experiments; Statistical consideration and reliability; Introduction to computer graphics fundamentals; Curves and surfaces modeling; Concepts of Solid modeling; Visual realism; Assembly of parts and product data Exchange. Basic concepts of material behavior: Elasticity and plastic behavior of metallic and non-metallic materials. Metallurgical aspects of Materials. Effect of temperature, strain and strain rate on plastic behavior - Super plasticity - Ductile, brittle transition in steel - High temperature fracture, creep - Larson Miller parameter - Deformation and fracture mechanism maps. Selection of metals based on mechanical properties - Selection for surface durability corrosion and wear resistance - Relationship between materials selection and processing - Case studies in materials selection with relevance to aero, auto, marine, machinery and nuclear applications. Non-metallic materials: Polymeric materials - Formation of polymer structure - Production techniques of fibers, foams, adhesives and coating - structure, properties and applications of engineering polymers; Elasticity: Stress-Strain relations - Equations of equilibrium-compatibility-boundary conditions-three-dimensional stress of a tension generalized hook's law - St. Venant's principle - plane stress - Airy's stress function; Applications of fatigue and fracture mechanics. Mechanics of composite materials and

PME2021  Energy Engineering
PME2022  Thermal Engineering
PME2023  Refrigeration and Air Conditioning
PME2024  Internal Combustion Engineering


PME2031  Manufacturing Systems Management
PME2032  Lean Manufacturing

PME2033  Project Management


PME2041  Welding Engineering


PME2051  Materials Engineering

PME2052  Metallurgy Engineering


PME2061  Industrial Engineering

Basic Statistics - Probability, LP - TP- Net Works - Queuing - Replacement - Simulation. Work Design:

**PME2081 Computer Integrated Manufacturing**

**PME2082 Advanced Manufacturing Engineering**


**PME2091 Printing and Packaging Technology**

cloth; Packaging machineries; Testing - mechanical, physical, performance testing, barrier properties, Polymer film - Extrusion - types, properties. Food packaging - aseptic packaging - sterilization - Modified atmosphere packaging - intelligent packaging - active packaging; Healthcare packaging - Packaging line engineering - barcodes - RFID - composite tubes - toxicological investigations; Package designing & shelflife; Closures; Packaging laws & Regulations; Package Cost Estimation; Supply Chain Management & Packaging Environment.

**PME2101 Mechatronics**


**PME2111 Production Engineering**

**PME2112 Manufacturing Engineering**

Engineering Mechanics, Solid Mechanics, Kinematics of Machines - Design of machine elements - Computer Aided Product Design - Jig fixture and tool designs. Theory of metal cutting - Basic Machining

**PME2121  Aeronautical Engineering**
**PME2122  Aircraft Maintenance Engineering**

**PME2151  Automobile Engineering**
**PME2152  Automotive Engineering**
**PME2153  Automotive Materials And Manufacturing**

PME2161 Solar Energy


PMS8011 Master of Business Administration with any specialisation


PSH7011 Environment Science


**PSH7041 Master of Computer Applications (MCA)**


**PTE5101 Biotechnology/ Industrial Biotechnology**

**PTE5102 Microbial Technology**

**PTE5103 Pharmaceutical Technology**

Prokaryotic and eukaryotic cell structure ; Microbial nutrition, growth and control; Microbial metabolism (aerobic and anaerobic respiration, photosynthesis); Nitrogen fixation; Chemical basis of mutations and mutagens; Microbial genetics (plasmids, transformation, transduction, conjugation); Microbial diversity and characteristic features; Viruses. Molecular analysis of UV/visible, florescence, circular dichroism, NMR and ESR spectroscopy, Electron microscopy - transmission and scanning electron microscopy - scanning tunnelling and atomic force microscopy, Molecular structure determination using X-ray diffraction and NMR; mass spectrometry, Analytical Ultracentrifugation; Sedimentation velocity and equilibrium, determination of molecular weights, Theory and principles of Chromatography. Media Design and requirements for fermentation processes, medium optimization methods, Stoichiometry of cell growth and product formation, Kinetics of microbial growth, substrate
utilization and product formation, Simple structured models, Sterilization of air and media, Thermal death kinetics of microorganisms, batch and continuous heat sterilization of liquid media, filter sterilization of liquid media, air sterilization and design of sterilization equipment, Batch, fed-batch and continuous processes, Bioreactor Scale-up, Various types of microbial and enzyme reactors, STR, packed bed reactor, airlift reactor, fluidized bed reactor and bubble column reactors, Online monitoring of bioprocess parameters such as pH, redox potential, DO, DCO2, temperature, cell density and vent gas analysis. Biological sequences analysis, Algorithms for local and global alignment of sequences, Multiple sequences alignment and applications, Phylogenetics; Character and Distance based methods, Protein secondary structure and tertiary structure prediction, Biological databases and tools, Microarray analysis, Basics of Systems Biology, Basics of PERL programming language and Linux Operation System.

PSH7081  Electronic Media
PSH7082  Visual Communication
PSH7083  Communication
PSH7084  Mass Communication
PSH7085  Journalism
PSH7086  Media Arts

Quantitative Methods: Content analysis - Survey Research - Questionnaire - Statistics.

**PSH7091  Mathematics**

**PSH7092  Applied Mathematics**


**PSH7101  Computer Science**

**PSH7102  Information Technology**


**PSH7111  Physics**

**PSH7112  Astrophysics**


- Specific heat of solids. Atomic spectra - Quantum numbers - Fine, Hyperfine structure - LS coupling -

PSH7121 Materials Science


**PSH7151** Chemistry  
**PSH7152** Applied Chemistry Organic Chemistry  
**PSH7153** Industrial Chemistry  
**PSH7154** Polymer Chemistry


**PSH7171** Geology  
**PSH7172** Applied Geology


PSH7181 English
PSH7182 Linguistics

PTE5011  Chemical Engineering
PTE5012  Petroleum Refining and Petrochemicals Engineering

PTE5031  Environmental Science and Technology

PTE5041  Industrial Safety Engineering
PTE5042  Fire Engineering and Safety Management
Probability and Reliability - random variable, special distributions, sampling, curve fitting, time series analysis, reliability, computer programming and software, safety in chemical industry - concept of safety and safety auditing, hazardous chemicals - precautions in handling, tolerance limits of industrial emissions, carcinogens-health hazards of insecticides, drinking water standards - computer aided hazards analysis, hazard, risk issues and hazard assessment, instrumentation, testing, risk analysis - environmental pollution control and industrial hygiene, EIA, impact assessment and documentation - industrial safety and hazards management - fire and explosion, relief systems, toxicology, leaks and leakages - process simulators - safety in engineering industry - metals and wood working machines, guarding, welding and gas cutting, cold forming and hot working, finishing, inspection and testing - regulations for health, safety and environment - safety management - construction - safety in material handling - noise and vibration controls - electrical safety - air pollution control - fire and explosive control and transport phenomena.

PTE5051  Textile Technology
PTE5052  Textile Chemistry
Mechanical Properties - Fabric Appearance and Other Properties - Dyeing and Finishing - Probability Distribution and Estimations - Analysis of Variance - Process Control and Capability Analysis - Design and Analysis of Experiments

**PTE5061**  Apparel Technology
**PTE5062**  Fashion Technology


**PTE5071**  Ceramic Technology


PTE5081  **Leather Technology**


**PTE5111 Food Technology**

**PTE5112 Food Processing**

**PTE5113 Food And Nutritional Biotechnology**

**PTE5114 Agricultural Processing and Food Engineering**
PSH7191 Food Chemistry and Food Processing

Food Chemistry - Composition of foods Nutrient and non-nutrient components of foods, water activity, lipid, carbohydrates, proteins, bioactive components, functional foods, analytical methods in food analyses; food additives, their functions and applications - Food microbiology - microbial spoilage of foods, food pathogens, food poisoning, food borne infections, microbes in food fermentation. Bioreactor and upstream processing, fermentation processes - batch, continuous, fedbatch, enzymes in food technology, microbial productions of aminoacids, proteins, lipids, flavor components, colouring agents. Types of processing - aseptic processing, drying and ultrafiltration, canning, radiation processing, CAP, MAP, Hurdle technology, newer methods- ohmic heating PEF, High pressure processing, food packaging technology. Cereal, Pulse and oilseed technology, meat, fish and poultry technology, dairy product technology, fruit and vegetable technology, flavours, spices, coffee, tea, cocoa. Heat Transfer, mass transfer, fluid mechanics, mass and energy balance, mechanical operations Engineering materials, pumps, principles of refrigeration, Equipment used for milling, extrusion, mixing, blending, filling, heat processing and cooling. Sensory evaluation of foods, consumer testing, food product development, Assessment of food safety, GHP, GMP, HACCP, sanitation and hygiene in food industry, food safety management systems, ISO. GM foods, use of biotechnology in enhancing food production and safety assessment. Food Laws and regulations - National and international, Codex, JECFA, USFDA, EFSA, FFSAi, BIS. Food economics and Trade, public distribution, food security.

PTE5121 Nano Science and Nano Technology


PTE5131 Plastic Technology

PTE5132 Rubber and Plastics Technology

PTE5133 Polymer Technology

Polymers-Classification of polymers - Functionality - Polymerization mechanism - Industrial polymerization techniques - Molecular weight of polymers and their significance - States of aggregation in polymers - Tg - Factors affecting Tg - Crystal nucleation and growth - Spherulite formation - Factors affecting crystallinity. Preparation, Structure - Property relationship and applications of General Purpose Rubbers, Special Purpose Rubbers, Polyurethanes and Thermoplastic Elastomers. Preparation,
Structure Property relationship and applications of Commodity Plastics, Engineering Plastics and Specialty polymers. Test for Processability - Viscosity - Flow characteristics - Vulcanization Tests for rubber. MFI - Gelation and Gel time, Test for Mechanical, Electrical and Optical Properties, Test for durability; Thermal analysis, Molecular weight studies, Spectroscopic and Morphological studies. Flow behavior of Polymers Compounding and Mixing process, Forming Operations - Extrusion, Injection molding, Blow molding, Compression and Transfer molding, Rotational molding, Thermoforming, Calendaring, Reaction Injection Molding; Latex processing and applications; Composite materials and Fabrication; Polymer recycling. Simple geometries - Spring rates - Creep - Stress relaxation - Design to Specific Spring rates, Rubber under complex loading, Rubber products under dynamic conditions, Property considerations in designing of Plastics Parts, Design of moulds and dies for Rubber and Plastics products.