

**SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR**



**Programme & Subject: M.Sc (Surface Coating Technology)
Syllabus with Effect from: 2018-19
Semester: III**

Paper Code: PS03CSCT21		Total Credit: 4
Title Of Paper: Technology of Resins for Surface Coating - I		
Unit	Description in detail	Weightage (%)
I	Chemistry and Technology of Synthetic resins viz. Alkyds, Polyester, Phenolics, Amino, Acrylic & Vinyl resins: Raw materials for these resins, Chemistry of synthesis of these resins, processing techniques, properties & applications of these resins for surface coatings.	70 %
II	Chemistry and Technology of Natural resins like rosin, shellac, Bitumen, Asphalts and Coal tar – Their modifications & uses	30 %

Basic Text & Reference Books:-

- Surface Coatings – Raw Materials & Their Usage, OCCA-VOI I “Chapman and Hall”, NY, 1993.
- Resins for surface coatings, Vol I, II & III, P.K.T. Oldring, SITA Technology
- Resins for coating: Chemistry, Properties and Applications, 1st ed, Stoye D, Hanser Publishers, 1996
- “Organic coatings, Science & Technology” Vol I, Wicks, Wiley Interscience Pub. Ltd, 1992
- The Chemistry of Organic Film Formers, Soloman, D.F. Wiley, New York.
- Swaraj Paul, ‘Surface coating’, 2nd ed., John Wiley & Sons Ltd, 1996.
- Surface coatings Vol 1 to 3 WILSON, 1st ed, Elsevier Applied Science, 1986
- The Technology of Paints, Varnishes & Lacquers, 1st ed., C.R. Martens, Roberts E Kniger Pub. Co-Oprat, 1974
- High solids Alkyd Resins, Holmberg Krister, Marcel Dekker, 1987
- CNSL Patents, Cashew promotion council, Ernakulam
- WM Morgan, “Outlines of Paint Technology.”, 3rd ed, CBS Publishers & Distributors, 1996
- Alkyd Resin Technology, T.C. Patton
- “Paints and surface coatings -Theory & Practice”, 2nd ed., R. Lambourne & T.A. Stevens, William Andrew Publishing, 1999
- Water borne and Solvent based Coatings, Resins & Their Applications – Vol 1, OLDRING, 1996.

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Surface Coating Technology)
Semester: III
Syllabus with Effect from: 2018-19

Paper Code: PS03CSCT22		Total Credit: 4
Title Of Paper: Technology of Paint Manufacturing		
Unit	Description in detail	Weightage (%)
I	Principles of Paint Formulation, Rheology of mill base consistency by Daniel flow point and f (PVC); Concept of Pigment Volume concentration (PVC) and CPVC, RTM & MBC	30 %
II	Theory of pigment Wetting and dispersion; Dispersion technology, Coating manufacturing equipments - Machinery used for grinding of minerals and Pigments for paints including Balls Mill, Sand Mill, Dyano Mill, Attritor, Basket Mill, HSDD, TSD, TRM etc.	50 %
III	Plant Location & Paint Factory Layout; Important concepts of production management	10 %
IV	Pollution & its control in paint industry; Safety & Hygiene in Paint Industry	10 %

Basic Text & Reference Books:-

- Surface coatings: Vol II: Paints & Their Applications, 2nd ed., OCCA, Chapman and Hall, 1984
- “Paint flow and pigment dispersion”, 2nd ed., T.C.Patton, 1979
- “Paints and surface coatings -Theory & Practice”, 2nd ed., R. Lambourne & T.A. Stevens, William Andrew Publishing, 1999
- Basics of Paint Technology, Vol I, V.C. Malshe, 1st ed. 2000
- Basics of Paint Technology, Vol II, V.C. Malshe, 1st ed. 2008
- Organic Coatings - Applications, Properties & Performance, Vol II, Wicks Z. W., wiley interscience pub.ltd., 1992
- Paint Formulations: Principles & Practice; J. Boxal & Fraunhoffer
- Concise Paint Technology, J. Boxal & Fraunhoffer, 1st ed., Chem Pub., 1979
- “Introduction to Paint Chemistry & Principle of Paint Technology”, 3rd ed., Turner G.P, Chapman & Hall, 1988

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Surface Coating Technology)
Semester: III
Syllabus with Effect from: 2018-19

Paper Code: PS03CSCT23		Total Credit: 4
Title Of Paper: Technology of Architectural Coating, Industrial Coatings & Construction Chemicals		
Unit	Description in detail	Weightage (%)
I	Classification of coatings; Mechanisms of film formation in surface coatings	10 %
II	Technology of solvent based architectural & industrial coatings	20 %
III	Technology of Water based Paints & coatings: Cement Paints, Chemistry and technology of emulsion and latex paints, Preparation of latex, Emulsion Polymerization Plant and Design; Developments in waterborne coatings	30 %
IV	Technology of Varnishes & lacquers	10 %
V	Technology of Powder coatings	10 %
VI	Specific application Paints and Coatings: Wood Finishes, Road Marking Paint, Automotive coatings and refinishes, Novelty Finishes	10 %
VII	Technology of Construction Chemicals: Adhesives & Sealants, Water proofing compounds, Polymeric Additives for Concrete admixtures, Curing Compounds etc	10 %

Basic Text & Reference Books:-

- The Technology of Paints, Varnishes & Lacquers, 1st ed., C.R. Martens, Roberts E Kniger Pub. Co-Oprat, 1974.
- Surface Coatings – Raw Materials & Their Usage, OCCA-VOI I “Chapman and Hall”, NY, 1993
- “Paints and surface coatings -Theory & Practice”, 2nd ed., R. Lambourne & T.A. Stevens, William Andrew Publishing, 1999.
- Water borne and Solvent based Coatings, Resins & Their Applications – Vol 1, OLDRING, 1996.
- Emulsion Polymers and Emulsion Polymerization, BASSETT.
- Waterborne Coatings: Emulsions And Water Soluble Paints. ‘C.R. Martens’. Van Nostrand Reinhold Company, 1981
- WM Morgan, “Outlines of Paint Technology.”, 3rd ed, CBS Publishers & Distributors, 1996.
- Principles of Emulsion Technology; Bacher & Paul
- “Organic Coating Technology - VOI II”, HF Payne, 3rd ed John Wiley & Sons Ltd, 1967
- Protective & Decorative Coatings, Vol I, II & III, J.J. Mattiello
- Powder coatings: A Practical Guide to equipments, Process & Productivity at a profit, Vol II, Howell David M, John Willey, 2000.

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Surface Coating Technology)
Semester: III
Syllabus with Effect from: 2018-19

Paper Code: PS03CSCT24		Total Credit: 4
Title Of Paper: Practical - Processing of Surface Coatings - I		
Unit	Description in detail	Weightage (%)
	Synthesis & characterization of various surface coating resins like Hard resins, Alkyds, Varnishes, Polyesters, Epoxies, Polyamides, Acrylics, Amino resins, CNSL resin, emulsions & water reducible resins etc.	100 %

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Surface Coating Technology)
Semester: III
Syllabus with Effect from: 2018-19

Paper Code: PS03CSCT25		Total Credit: 4
Title Of Paper: Practical - Processing of Surface Coatings - II		
Unit	Description in detail	Weightage (%)
	Daniel flow point, Preparation of selected organic & inorganic pigments; Preparation of different architectural & industrial coatings like Enamels, Primers, Putties, Lacquers, Water based paints, Inks, HDPCs, Conversion coatings etc.	100 %

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Surface Coating Technology)
Semester: III
Syllabus with Effect from: 2018-19

Paper Code: PS03ESCT21		Total Credit: 4
Title Of Paper: Chemical Reaction Engineering		
Unit	Description in detail	Weightage (%)
I	Classification of Chemical Reactors; Design equations for isothermal and adiabatic operation; Multiple reactor system, Recycle reactors, constant volume and constant pressure reactors; Kinetics of reversible, complex (Parallel and Series) and Autocatalytic reactions; Kinetics of heterogeneous reactions – Global rate of reaction; Adsorption Langmuir and BET; Catalyst Promoters, Poisons and Inhibitors, Surface Reactions Unimolecular and Bimolecular; Introduction to Catalytic Reactors	100 %

Basic Text & Reference Books:-

- Chemical Reaction Engg. by Octave Levenspiel , 3rd Ed. John Wiley & Sons.
- Chemical Engg. Kinetics, by JM Smith, 3rd Ed. McGraw Hill Book Co.
- Fundamentals of Chemical Reactions Engg., 2nd Ed. by Holland and Anthony, Prentice-Hall International Edition.
- Chemical Reactor Theory, by Denbigh and Turner, University of Cambridge.
- Reaction Engg. through solved problem, by Srivastva and Pande, Metropolitan Book Co(P)Ltd, New Delhi
- Chemical Kinetics, by S.K. Jain, Vishal Publication , Jalandhar

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Surface Coating Technology)
Semester: III
Syllabus with Effect from: 2018-19

Paper Code: PS03ESCT22		Total Credit: 4
Title Of the Paper: Technology of Packaging and Printing Inks		
Unit	Description in detail	Weight age (%)
I	Difference between Paints and Inks- Formulation, manufacturing & Application basis. The different printing Processes like Gravure, Flexographic, Screen, Lithography, Letterpress, inkjet, Photostat copier - their merits and demerits.	35 %
II	Classification of Inks on the basis of Printing Processes. Their manufacturing techniques. Quality control of Inks. Methods of Ink Drying.	
III	Specialty Inks (Antiforgery/Security). Behavior of Inks on machines; Trouble shooting in various printing processes; Storage stability of Inks	25 %
IV	Elements of packaging, natural packaging, packaging values, Professional approach to develop package for food products, general consumables, cosmetics, pharmaceuticals, engineering materials and other utilities.	
V	Packaging materials and their forms. Paper and paper board, folded cartons and setup boxes, corrugated board, box construction, interior packing's, moulded forms, paper composites, tetra pack, wood containers, glassware's.	20 %
VI	Plastic as packaging material in different forms- flexible polymeric films, metallic foils, orientation and metallization. Metal containers- tin plate cans, tin free steel cans and tempers, coatings and linings, aluminum cans, collapsible tubes, fiber tubes, Aerosols-principle, valves. Coatings and lamination, paper films and foils for lamination, adhesives, labels and labeling, heat transfer labels, coding and holograms etc. Package printing importance, Package disposal, Eco-Friendly packing's, Innovations in packaging: Active packaging, anti microbial containers, RFID technologies.	20 %

Basic Text & Reference Books:-

- Printing Ink Manual; by R. H. Leach & R. J. Pierce
- Handbook on Printing Technology
- Modern Printing Technology
- Complete Book on Printing Technology
- Handbook of Package Engineering by Joseph F. Hanlon
- Edible Coatings & Soluble Packaging by Roger Daniels