

**SARDAR PATEL UNIVERSITY  
VALLABH VIDYANAGAR**



**Programme & Subject: M.Sc (Surface Coating Technology)  
Syllabus with Effect from: June - 2017  
Semester: I**

<b>Paper Code: PS01CSCT21</b>		<b>Total Credit: 4</b>
<b>Title Of Paper: Chemistry &amp; Technology of Oils &amp; Polymer Science</b>		
<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
I	Chemistry and classification of Oils (Triglycerides); Characteristics, properties and uses of Drying, semidrying and Non-drying oils; Modified and treated oils their types, manufacturing processes, properties and uses.	30 %
II	Historical developments in Polymeric materials; Concept of Monomer, Oligomer & Polymer (Homopolymers & Colopolymers); Classification of Polymer; Types of Polymerization - Addition & Condensation polymerization, Techniques of polymerization – Bulk, Solution, Suspension & Emulsion; Kinetics of Polymerization	30 %
III	Functionality concept; Concept of Molecular weight of polymer, Determination of molecular weight.	20 %
IV	Characterization of polymers by Advanced Instrumental Techniques viz. TGA, DSC, FTIR etc.	20 %

**Basic Text & Reference Books:-**

- Bailey's Industrial Oils and Fat products Vol I to Vol V, Hui Y.H., 5th ed; John Wiley and Sons, NY., 1996
- WM Morgan, "Outlines of Paint Technology.", 3rd ed, CBS Publishers & Distributors, 1996
- Surface Coatings – Raw Materials & Their Usage, OCCA-VOI I "Chapman and Hall", NY, 1993
- Introduction to Drying oil Technology by AR Mills.
- Oldring PKT "Resins for surface coatings - VOI I", 2nd ed., 1995
- Principles of Polymer science, by Bahadur and Sastry, Narosa Publishing House 2002.
- Polymer Science by Gowarikar, John Wiley and Sons, 1st ed., 1991
- Encyclopedia of polymer Science and Engineering, 2nd ed., John Wiley and Sons, Inc
- Polymer Chemistry by Malcolm P. Stevens, Oxford University Press Inc, 1990.
- Text book of Polymer Science, Billmeyer, John Wiley and Sons, .3rd ed.
- Principles of Polymer Systems, Rodriguez, Hemisphere Publishing Corpn, 1982.
- Introduction to Polymer Science and Technology, H.S. Kaufman and J.J. Falcetta, Willey – Interscience Publication, 1977
- Polymer Science and Technology of Plastics and Rubbers, 1st ed., P.Ghosh, Tata McGraw – Hill Publishing Company 1990.
- Text book of polymer Science, P. Nayak and S.Lenka, Kalyani Publishers, 1986.
- Fundamentals of polymer science an introductory text, P.Painter and M. Colman, Technomic publishing Co Inc, 1994.
- Paint technology Manual, Part 2, 2nd ed., OCCA, "Chapman and Hall", NY 1969.
- Polymer chemistry, Seymour and Carraher, Marcel Dekker,2003.

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<b>Paper Code: PS01CSCT22</b>		<b>Total Credit: 4</b>
<b>Title Of Paper: Chemistry &amp; Technology Of Inorganic Pigments</b>		
<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
I	Theory of Color; Important Physico-Chemical Characteristics of Pigments, Analysis & testing of pigments	20 %
II	Classification of Inorganic Pigments; Chemistry, Properties and Applications of White pigments like Titanium Dioxide, Zinc Oxide etc.; Chemistry & technology of Fillers	30 %
III	Technology of Carbon Black Pigment; Manufacture, Properties and Applications of Metallic Pigments, Metal Oxide Pigments, Iron Blue Pigments, Ultra marine Blue & Chromium Pigments	30 %
IV	Manufacture, Properties & Application of anticorrosive pigments.	20 %

**Basic Text & Reference Books:-**

- HF Payne VOI II, Organic Coating Technology, 3rd ed John Wiley & Sons Ltd, 1967
- WM Morgan, "Outlines of Paint Technology.", 3rd ed, CBS Publishers & Distributors, 1996
- Surface Coatings – Raw Materials & Their Usage, OCCA-VOI I "Chapman and Hall", NY, 1993.
- T.C. Patton, Pigment Handbook, 3 Vols, Wiley-Interscience, New York, 1973.
- P.A. Lewis, Pigment Handbook, 3 Vols, Wiley-Interscience, New York, 1985.
- Industrial Inorganic Pigments, BuxBaun, 3rd ed., 2005, Wiley – VCH Verlag
- Metallic Pigments in Polymer, 1st ed., Ian Wheeler, Rapra Tech. Ltd., 1999
- Solomon 'Chemistry of Pigments & Fillers.', 1st ed., John Wiley & Sons., 1983
- Swaraj Paul, 'Surface coating', 2nd ed., John Wiley & Sons Ltd, 1996.
- Z.W.Wicks, Jones, Pappas; "Organic Coatings" Sci. & Tech, VOI I John Wiley and Sons, Inc., NY 1992.
- Pigments: An introduction to physical Properties, David Patterson
- Basics of Paint Technology, Vol I, V.C. Malshe, 1st ed. 2000

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<b>Paper Code: PS01CSCT23</b>		<b>Total Credit: 4</b>
<b>Title Of Paper: Surface Chemistry &amp; Surface Engineering</b>		
<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
I	Surface Chemistry: Application of surface chemistry, Interfacial tension, Free energy changes, wetting & emulsification; Chemistry & Technology of Surfactants.	50 %
II	Surface Engineering: Introduction; Electroplating; Thermal Spray Coating; Cold Gas Dynamic Coating; Diffusion Coating; CVD & PVD; Plasma Immersion Ion implantation; DLC thin film; Sol Gel Coating; Laser Assisted Surface Engineering; Micro Arc Oxidation; Electro Spark Coating etc.	50 %

**Basic Text & Reference Books:-**

- Surfactants and Interfacial Phenomena, Milten, J. Rosen, Wiley Inter science Publication, New York.
- "Paint flow and pigment dispersion", 2nd ed., T.C.Patton, 1979.
- Fats, oleochemicals and surfactants : Challenges in the 21st century, Mani, V.V.S and Shitole
- Chemistry and Technology of Surfactants, Richard J. Farn, Blackwell Publishing Ltd
- Surface Engineering: ASM Handbook Volume 5, ASM International

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<b>Paper Code: PS01CSCT24</b>		<b>Total Credit: 4</b>
<b>Title Of Paper: Practical : Analysis of Pigments, Oils &amp; Resins</b>		
<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
	Qualitative & quantitative analysis of different organic & inorganic Pigments, Vegetable oils, Natural & Synthetic resins.	100 %

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<b>Paper Code: PS01CSCT25</b>		<b>Total Credit: 4</b>
<b>Title Of Paper: Practical : Analysis of Architectural Coatings</b>		
<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
	Qualitative & quantitative analysis of various architectural coatings like different varnishes, Solvent based architectural paints, Primers, Putty, Water based paints etc. Demonstration Practical: Mechanical Engineering Operations	100 %

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<b>Paper Code: PS01ESCT21</b>		<b>Total Credit: 4</b>
<b>Title Of Paper: Process Control &amp; Instrumental Analysis</b>		
<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
I	Laplace transform, Response of first order system, First order in series, second order system. Time constants of measuring elements, modes of control action, selection of control modes, feed back systems component, Negative and Positive feed back systems, response time, Rise time, over shoot, decay ratio, transducers, Pneumatic and electronic controllers baffle nozzle mechanism for  P, PI and PID systems.	50 %
II	Instrumental Analysis, Sample conditioning for process analyzers, Application of on line analyzers in paint industries, IR process analyzers, UV/VIS absorption analyzers. Process gas and process liquid chromatography, HPLC, GC, TLC, Column, Paper. Use of ion- exchange resin in chemical analysis.	50 %

**Basic Text & Reference Books:-**

- Process systems Analysis and control, by D.R. Coughanour; 2nd ed Mc Graw Hill international Edition.
- Chemical Process Control, An Introduction to Theory and Practice by G Stephanopoulos, Prentice Hall of India Private Ltd, New Delhi.
- Instrumental Methods of Chemical Analysis, by B.K. Sharma, 2nd Edition, GOEL Publishing House , Meerut
- Spectroscopy of organic compounds, by P.S. Kalsi, 5th Ed. New Age International Publishers.
- Analytical Chemistry by D. Kealy and P.J. Haines, Viva Books Pvt. Ltd., New Delhi.
- Organic Spectroscopy by W. Kemp. 3rd Ed. ELBS with Mac Millan

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<b>Paper Code: PS01ESCT22</b>		<b>Total Credit: 4</b>
<b>Title Of Paper: Fundamental Mechanical Engineering for Coating Technologist</b>		
<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
I	Introduction; Engineering Materials & Their Properties; Elements of power transmission, Couplings & Seals; Metal Cutting Machines; Sheet Metal Operations; Welding & Casting; Abrasive Machining Process; Hydraulic & Pneumatic systems; Nozzles & Spray Guns; Spraying Systems; Robotics; Forging & Rolling	100 %

**Basic Text & Reference Books:-**

- Basic Mechanical Engineering, by R B Arora & B K Raghunath, Atul Prakashan
- Robotics: Principal & Practice, Dr K.C. Jain, Dr. L.N. Aggarwal, Khanna Publications
- Introduction to Robotics: Analysis, Systems, Applications, Saeed B. Niku, PHI Pvt. Ltd.
- Introduction to Hydraulics (3rd ed), John Pippenger, Tyler Hicks, Mc-Graw Hill Book Co.,
- Oil Hydraulic Systems: Principles & maintenance, Majumdar S.R.
- Hydraulics & Pneumatics: A Technician's & Engineers' guide, Andrew Parr, Jaico Publishing House