

[96]

No. of Printed pages: 2

## SARDAR PATEL UNIVERSITY

M.Sc. 3<sup>rd</sup> Semester (Surface Coating Technology) (CBCS) Examination

Tuesday, 05<sup>th</sup> April 2016

Time: 02:30 pm to 5:30 pm

Course No.: PS03CSCT01

Subject: Technology of Resins for Surface Coatings- 1

Total Marks: 70

N.B. (1) Marks allotted to the question are on its RHS

(2) Illustrate your answers wherever necessary with the help of neat sketches & chemical equations

Choose the correct answer from the following

- Q.1. 1 Abetic acid is present in \_\_\_\_\_. (1)  
(a) Damar (b) Shellac (c) Amber (d) Colophony
- Q.1. 2 Resole are prepared using an F: P ratio of about \_\_\_\_\_ and reaction is brought about under highly \_\_\_\_\_ conditions. (1)  
(a) 1.74 : 1 and Alkaline (b) 1.75 : 1 and Acidic (c) 0.89 : 1 and Alkaline (d) 0.85 : 1 and Acidic
- Q.1. 3 \_\_\_\_\_ is a main functional raw material for Unsaturated Polyester resin systems containing reactive diluents. (1)  
(a) Phthalic Anhydride (b) Maleic Anhydride (c) Trimellitic Anhydride (d) Propylene Glycol
- Q.1. 4 In Alkyd Resin formulation  $2 m_0/e_0$  represent for \_\_\_\_\_. (1)  
(a)  $P_{Gel Point}$  (b)  $F_{av}$  (c) Degree of Polymerization (d) Alkyd Constant
- Q.1. 5 \_\_\_\_\_ Process is normally used, only where there are problems associated with the solubility or reactivity of the di-carboxylic acid. (1)  
(a) Alcoholysis (b) Acidolysis (c) Fatty acid (d) Amidation
- Q.1. 6 The major problem with Water Reducible alkyd system is \_\_\_\_\_ due to the presence of easily hydrolyzed ester linkages. (1)  
(a) Poor acid resistance (b) Poor hydrolytic stability (c) Poor colour stability (d) Poor Odour
- Q.1. 7 The addition of \_\_\_\_\_ is recommended during end of the processing of Acrylic resin. (1)  
(a) Esterification (b) Etherification (c) De-esterification (d) Inhibitors
- Q.1. 8 *TEFLON* is a trade name of which company (1)  
(a) Montedison (b) Hoechst (c) ICI (d) Du Pont
- Q.2 Attempt **any Seven** Questions: (14)
- (a) Discuss about Bituminous Material Shellac?
- (b) Calculate the amount of Pentaerythritol require to complete neutralization of 100 gms of Rosin. Consider 90% of acid in Rosin.
- (c) Write a brief note on Alcoholysis Process.
- (d) Describe the advantages of solvent process over fusion process in alkyd resin manufacture.
- (e) Write a chemical reaction used in synthesis of Saturated polyester resin (Reaction-1 to 3).
- (f) Discuss the significance of reaction temperature for polyester resin manufacture, with respect to polybasic acid.
- (g) Discuss about Core Shell Polymerization technique.
- (h) Write a brief note on Drip Feed Solution Polymerization Process for acrylic monomers.
- (i) List the grades of Resoles in Phenolic Resin and Explain one of them in brief.
- Q.3 a Describe the possible reactions of Rosin. Write a note on making of Rosin Modified Maleic Resin along with its properties and uses. (6)

Q.3 b What is ester gum? How is it employed in the Paint and Varnish industry, and what advantages has it over rosin? (6)

OR

Q.3 a (1) Write the factors influencing the choice of Alcohol used for Alkylation's in making of Amino resins. (3)

(2) Write the structures for the 1, 3, 5-Triazine-2, 4, 6-triamine, Benzoguanamine, Glycolril. (3)

Q.3 b Explain the making of Resole and Rosin Modified Phenolic resin (RMP) along with its properties and uses. (6)

Q.4 a List physically and chemically modified Alkyd resins. Explain in detail Urethane modified alkyd resins along with its uses. (6)

Q.4 b Formulate an alkyd resin with 62.5 % oil length (Soyabean Oil) with Pentaerythritol as polyol with 5% excess OH group over polyol and also calculate R, K, P,  $F_{avg}$ , Water of Reaction, Oil length, % Yield, Initial Acid value and Hydroxyl value for the same. (6)

OR

Q.4 a Write a note on Water borne Alkyd resins. (6)

Q.4 b Calculate R, K, P,  $F_{avg}$ , Water of Reaction, Oil length, % Yield, Initial Acid Value and Hydroxyl Value in finished Short oil Alkyd resin. (6)

Sr. No	Ingredients	Weight (in Gms)
1	Coconut Oil	32
2	Phthalic Anhydride	42
3	Glycerin	26

Q.5 a With a neat sketch explain the plant requirement for the production of Polyester resin. Describe the processing of polyester resin. (6)

Q.5 b Formulate oil-free polyester resin based on 20.40 : 24.81 : 18.51 weight (in gms) of Isophthalic acid : Terphthalic acid : Phthalic Anhydride with target acid value of 5 using neopentyl glycol, 1,3 hexane diol and Ethylene glycol (19.31:21.41:7.61 weight (in gms). Calculate the water of esterification, % Yield, Excess Hydroxyl, Hydroxyl number,  $F_{avg}$ ,  $P_{gel}$  and molecular weight. (Eq Wt of IPA=83, TPA = 83, PA = 74, NPG = 52, 1,3 hexane diol=59 and EG=31). (6)

OR

Q.5 Give the causes and remedies for the following **any Four** in Polyester cook (12)  
 (a) Glycol Losses (b) Foaming (c) Gelation (d) Condenser Flooding (e) Long Processing Time.

Q.6 a Write the chemical formulae for the following monomers: (6)

- (a) Acrylamide (b) Methyl Methacrylate (c) Butyl Methacrylate  
 (d) Hydroxy Ethyl Methacrylate (e) 2-Ethyl Hexyl Methacrylate (f) Glycidyl Acrylate

Q.6 b Write the curing and film forming reactions of the hydroxyl and carboxyl functional groups incorporated in Acrylic resins for use in surface coating applications. (6)

OR

Q.6 b List the commercially available four general Vinyl Chloride Copolymers and discuss any one of them in detail (6)