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SARDAR PATEL UNIVERSITY

M.Sc. (3rd Semester) (Surface Coating Technology) (CBCS) Examination

PS03CSCT01: Technology of Resins for Surface Coatings- 1

Time: 02:00 pm to 05:00 pm

Thursday, 2nd November 2017

Total Marks: 70

Choose the correct answer from the following

- Q.1. 1 Novalac 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. 2 In Alkaline solutions at elevated temperatures, formaldehyde under goes _____ yielding Methanol and Formic Acid which tend to lower pH and consequently alkali has to be added, during the methylation reaction to keep the pH constant. (1)
(a) Cannizaro's reaction (b) Mannich reaction
(c) Aldol reaction (d) Diels Alder reaction
- Q.1. 3 The major problem with _____ system is poor hydrolytic stability due to the presence of easily hydrolyzed ester linkages. (1)
(a) Alkyd Emulsion (b) Self Emulsifying Alkyd (c) Water Reducible Alkyd (d) None of these
- Q.1. 4 The main ingredient in oxidative cured coating is _____. (1)
(a) Corn Oil (b) Cottonseed oil (c) Linseed oil (d) Castor Oil
- Q.1. 5 _____ Systems containing reactive diluent can be applied in any thickness. (1)
(a) Alkyd Emulsion (b) Self Emulsifying Alkyd
(c) Water Reducible Alkyd (d) Unsaturated Polyester resin
- Q.1. 6 Minimum Film Forming Temperature is governed by _____ of the polymer. (1)
(a) M_n (b) M_w / M_n (c) T_g (d) M_w
- Q.1. 7 Thermoplastic Acrylic Resins are formulated to a molecular weight range between _____ & _____. (1)
(a) 30000 & 200000 (b) 300000 & 100000 (c) 300000 & 2000000 (d) 3000 & 2000
- Q.1. 8 _____ is a trade name of Du Pont (1)
(a) TEFLON (b) DYNEON (c) FLUON (d) DAIKIN-POLYFLON
- Q.2 **Attempt any Seven Questions:** (14)
- (a) Explain in brief about Ester Gum.
(b) Discuss about Polyvinyl Butyral resin.
(c) Describe the advantages and disadvantages of the use of fatty acid as opposed to oils.
(d) Write a brief note on Alcoholysis Process.
(e) Describe the advantages of solvent process over fusion process in alkyd resin manufacture.
(f) Write a chemical reaction used in synthesis of Saturated polyester resin (Reaction-1 to 3).
(g) Discuss the significance of reaction temperature for polyester resin manufacture, with respect to polybasic acid.
(h) Justify the statement that "8 to 10 % of Methanol is added as a stabilizer in formalin".
(i) Calculate the amount of Glycerol require to complete neutralization of 100 gms of Rosin. Consider

90% of acid in Rosin.

- Q.3 a List the various phenols along with its functionality and different source of formaldehyde used for making Phenolic resins. (6)
- Q.3 b Explain the making of Resole and Rosin Modified Phenolic resin (RMP) along with its properties and uses. (6)

OR

- Q.3 a Explain the methylation stage and alkylation stage in the synthesis of Butylated Melamine formaldehyde resin. (6)
- Q.3 b Write the factors influencing the choice of Alcohol used for Alkylation's in making of Amino resins. (6)
- Q.4 a Define Oil Length and $P_{gel\ point}$. Derive the fundamental equation of $P_{gel\ point} = 2 m_0 / e_0$. (6)
- Q.4 b List physically and chemically modified Alkyd resins. Explain in detail Epoxy modified alkyd resins along with its uses. (6)

OR

- Q.4 a Write a note on Self-emulsifying 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 Give the causes and remedies for the following in Polyester cook
(a) Glycol Losses (b) Foaming (c) Gelation (d) Condenser Flooding (e) Long Processing Time. (6)

OR

- Q.5 b Write a note on TEFLON? (6)
- Q.6 a 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)
- Q.6 b Explain Drip feed solution polymerization process along with its advantages and Calculate Tg of a copolymer with 10% Styrene, 15% MMA, 15 % Butyl acrylate, 10% HEMA, 25 % Butyl Acetate and 23 % Xylene 2 % BPO. (Tg of Styrene= 100°C , MMA = 103 °C, BA = - 54°C and HEMA = 85°C) (6)

OR

- Q.6 b Match A with B with C (6)

Monomers (A)	Chemical Formulae (B)	Properties (C)
1. Methyl Methacrylate	a. $CH_2=CH C_6H_5$	I. Offers better solvent solubility and much more flexible & extensible.
2. Styrene	b. $CH_2=C(CH_3)-COOCH_3$	II. Surface wetting and substrate adhesion.
3. Meth acrylic Acid	c. $CH_2=C(CH_3)-COOC_4H_9$	III. Contributes to hardness, Chemical resistance and economy.
4. Butyl Methacrylate	d. $CH_2=C(CH_3)-COOH$	IV. Contributes to hardness, tensile strength and color stability.

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No of printed pages: 2

SARDAR PATEL UNIVERSITY

[63] M.Sc. (3rd Semester) (Surface Coating Technology) (CBCS) Examination

PS03CSCT02: Technology of Paint Manufacturing

Time: 02:00 pm to 05:00 pm

Monday, 6th November 2017

Total Marks: 70

Choose the correct answer from the following

- Q.1. 1 At CPVC if adhesion failure is cohesive then _____ (1)
 (a) Coating film breaks (b) No change
 (c) Interface separation of coating & substrate (d) None of above
- Q.1. 2 In latex paint LCPVC _____ as the particle size of latex decreases. (1)
 (a) Decrease (b) Increases (c) remain same (d) Doubles
- Q.1. 3 In industrial practice the ball charge (metallic Ball) to ball mill is _____. (1)
 (a) 1/2 (b) 1/3 (c) 1/4 (d) 3/4
- Q.1. 4 As low shear rate in HSDD which flow pattern develop? (1)
 (a) Laminar (b) Smear (c) Smash (d) Turbulent
- Q.1. 5 High carbon steel balls ware loss may range from _____ % w / 100 hr (1)
 (a) 0.3-0.7 (b) 0.03-0.7 (c) 3.0-7.0 (d) 8-10
- Q.1. 6 Height of charged material _____ of disc diameter in HSDD (1)
 (a) D to 2 D (b) 0.2-0.4 D (c) 2.8-2.0 D (d) 8-18 D
- Q.1. 7 Loading lower than _____ % of the ball mill volume introduce a slippage and excessive wear of ball mill surface. (1)
 (a) 10 (b) 20 (c) 30 (d) 40
- Q.1. 8 Which is a highly efficient process for producing fine pigment dispersion in ball mill? (1)
 (a) Centrifuging (b) Cataracting (c) Cascading (d) Repulsing
- Q.2 **Attempt any Seven Questions:** (14)
- (a) What is "Solvent Shock"? How it results in to flocculation?
 (b) How CPVC of pigment combination can be calculated? Give Equation.
 (c) Write advantages and disadvantages of Ball Mill.
 (d) Explain laminar & turbulent flow in HSDD
 (e) Explain 'nip clearance' in TRM.
 (f) How temperatures build up during processing affect dispersion in HSDD?
 (g) Factors affecting Oil Absorption in PVC.
 (h) Give procedure to operate conventional TRM step by step (Fixed Central Roll)
 (i) Discuss 'US REGULATIONS' to control VOC.

- Q.3 a Explain in detail with figure, smearing versus smashing dispersion. (6)
- Q.3 b Discuss ball size density and shape in ball mill. Give details about ceramic balls, metallic balls uses in ball mill. (6)

OR

- Q.3 a Discuss size of ball mill and optimum speed of rotation. Explain optimum ball charge to ball mill with diagram (6)
- Q.3 b 1) Advantages and Disadvantages of Ball mill (3)
2) Advantages and Disadvantages of TRM (3)
- Q.4 a Calculate CPVC of given Pigment Combination. (6)
1. Zinc Oxide . weight 20% Sp Gravity 5.60 , O.A 17
1. Iron Oxide synthetic weight 25% , Sp Gravity 4.80 , O.A 22
1. Talcum weight 10% Sp Gravity 2.80 , O.A 35
- Q.4 b What is binder index? Give an account of 'LCPVC'. (6)

OR

- Q.4 a What is 'enamel hold out'? Why it is desirable to design primer with PVC Greater than CPVC? How Hiding is affected by PVC? (6)
- Q.4 b Mill base rheology in HSDD with diagram. Discuss size positioning and speed of disperse blade. (6)
- Q.5 a Draw schematic diagram of conventional TRM. Explain its working in detail. (6)
- Q.5 b How good, fair, and poor dispersion can be achieved by WET point and FLOW point. (6)

OR

- Q.5 a What is charge repulsion and Entropic repulsion? Which one is more important in Aqueous dispersion? Explain in details with effect of layers adsorbed. (6)
- Q.5 b Discuss three major factors determines the selection of bead in bead mill. Bead size, density and chemical composition. (6)
- Q.6 a Discuss importance of plant location & factors should be considered in choosing plant site (6)
- Q.6 b Discuss different factors regards to 'Plant Lay out' (6)

OR

- Q.6 b Discuss health and safety regulations in details with different abetment.* (6)

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No of printed pages: 2

SARDAR PATEL UNIVERSITY

M.Sc. (3rd Semester) (Surface Coating Technology) (CBCS) Examination

PS03CSCT03: Technology of Architecture Coatings, Industrial Coatings and Construction Chemicals

Time: 02:00 pm to 05:00 pm

Wednesday, 8th November 2017

Total Marks: 70

Choose the correct answer from the following

- Q.1. 1 What is the ideal ratio of Pigment to Binder in top coat glossy paint? (1)
(a) 0.1 to 1 : 1 (b) 1.5 to 2.5 : 1 (c) 2.5 to 3.0 : 1 (d) 2.0 to 4.0 : 1
- Q.1. 2 The surface tension of dispersion is dependent on the _____ of the base polymer and nature (1)
and amount of hydrophilic commoner.
(a) polarity (b) wetting (c) spreading (d) flow ability
- Q.1. 3 Stainless steel contains Cr % _____ (1)
(a) 8% (b) 18% (c) 28% (d) 38%
- Q.1. 4 Which is not involve in sequence of manufacture Powder Coatings (1)
(a) Cooling (b) Drying (c) Sieving (d) Premixing
- Q.1. 5 During storage of Zinc Rich primer Zinc dust reacts with traces of water to give _____ gas. (1)
(a) N₂ (b) H₂ (c) CO₂ (d) Cl₂
- Q.1. 6 Commercial VAM Veova emulsions have particle size in the range of _____. (1)
(a) 0.5 to 1.0 μ (b) 0.05 to 1.0 μ (c) 0.1 to 1.0 μ (d) 0.1 to 0.5 μ
- Q.1. 7 Styrene is used as a _____ in formulation of knifing filler. (1)
(a) Antiskinning agent (b) Hardener (c) Filler (d) Reactive Diluent
- Q.1. 8 Etch Primers are used on which surface (1)
(a) Cement (b) Aluminum (c) Copper (d) iron
- Q.2 Attempt **any Seven** Questions: (14)
(a) Write the requirements for Zinc Dust for making sacrificial primer.
(b) Classify the Substrates used to apply coatings.
(c) Discuss the effects of CPVC (below and above) on the properties of the film.
(d) Give the schematic representation of fluidized powder bed.
(e) Discuss about MFFT.
(f) What is the importance of pH value in Architectural paints?
(g) Highlight the important properties of Water
(h) Distinguish between Coalescing agent and Co-solvent by giving suitable example.
(i) Write the role of additives as ingredient in water based paints.
- Q.3 a Write Formulation of Red Oxide Zinc Phosphate Epoxy Primer and calculate all values (6)
- Q.3 b What are Air drying synthetic enamels? Explain their composition. What are the different types of (6)
resins used in their formulation? What is the PVC range and mode of film formation?

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(P.T.O.)

OR

Q.3 b Write Formulation of Zinc Chrome Yellow Primer for Aluminum and other alloy and calculate all values (6)

Q.4 a Write a note on Multicoat systems? (6)

Q.4 b Develop formulation for two oxidative curable alkyd paints which differ significantly in the amount of pigment volume concentration (PVC). The pigment to binder ratio has to be 1:1 and 4:1. This non-volatile matter shall be 85% weight. The pigmentation shall be of Iron oxide (Sp. Gr = 5.1) and barium sulphate (Sp. Gr = 4.1) as an extender in the ratio 1:1. (Long oil Alkyd Resin (100%) Sp. Gr 1.2,) (6)

OR

Q.4 b Write note on Varnishes. (6)

Q.5 a Write a note on Exterior Paint on Mineral Substrate. Formulate White Exterior Paint (6)

Q.5 b Distinguish the properties between Water Soluble; Aqueous Dispersion and Colloidal Dispersion polymers. (6)

OR

Q.5 b Why thickener is used as a formulating ingredients in water based paint, classify? (6)

Q.6 a What are the different Admixtures for concrete? What is the reason for using them in concrete? (6)

Q.6 b Discuss the resins systems used in Powder Coatings? List various Test methods for Powder Coatings. (6)

OR

Q.6 b What is VOC? List the techniques to reduce VOC? What are the advantages and disadvantages of Powder Coatings? (6)

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No. of Printed pages: 2

SARDAR PATEL UNIVERSITY
M.Sc. 3rd Semester (Surface Coating Technology) Examination (CBCS)
Friday, November 10, 2017
Time: 2:00 pm to 5:00 pm
Course No.: PS03ESCT03

Subject: Technology of Packaging & Printing Inks

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

Q.1 Choose the correct option

- (1) Which printing is not called as planography printing process? (1)
a. Letterpress b. Lithography c. Flexographic d. Gravure
- (2) The approximate ink-film thickness applied to the substrate from the Offset Lithography printing process is _____ (1)
a. 1.5-2.5 μm b. 3-4 μm c. 2-4 μm d. 7-8 μm
- (3) In _____ printing process, the printing and nonprinting parts are on the same level. (1)
a. Letterpress b. Lithography c. Flexographic d. Gravure
- (4) _____ printing process is also called as silk printing process. (1)
a. Letterpress b. Lithography c. Screen d. Gravure
- (5) _____ spray the ink directly through a series of holes onto the surface of paper as the printhead scans back and forth across the paper. (1)
a. Ink jet printer b. Photocopy c. Thermal printers d. Ribbons
- (6) With _____, the imaging is carried out on the basis of photo-electronic effects. (1)
a. electrophotography b. ionography c. magnetography d. thermography
- (7) _____ is used for bulk handling, warehouse, storage and transport shipping. (1)
a. Primary b. Secondary c. Tertiary d. None of these
- (8) Choose non-basic functions of packaging? (1)
a. Inform b. Motivate c. Protect d. Convenient

Q.2 Answer any seven of the following

(14)

- 1 Give classification of impact printing process.
- 2 Write the function of fountain solution in OSL.
- 3 What is the principle of Screen printing process?
- 4 From which material Letterpress Type is made? Explain.
- 5 Write application of Gravure and Lithography printing process.
- 6 What is Aseptic packaging?
- 7 Enlist technical and marketing function of packaging.
- 8 What is shelf life?
- 9 What is biotic spoilage and abiotic spoilage?

(1)

(P.T.O.)

- Q.3(a) Discuss in detail factors that affect ink formulation. (6)
(b) How printing ink set and dry? Discuss in detail. (6)

OR

- Q.3(a) Enlist various plate used in OSL. Explain in detail pre-sensitized plate making for OSL. (6)
(b) Explain why viscosity control in Flexography printing is very much important? (6)

- Q.4(a) Discuss in detail products printed by screen printing. (6)
(b) Classify non-impact printing process and write its principle on which it's working. (6)

OR

- Q4(a) Write a note on toners for NIP processes. (6)
(b) Write a note on different types of security ink. (6)

- Q.5(a) Discuss about 'Lifestyle changes and their impact on packaging'. (6)
(b) Discuss properties, uses, advantages and disadvantages of glass used as packaging. (6)

OR

- Q5(a) Discuss properties, uses, advantages and disadvantages of Aluminum used as packaging. (6)
(b) Explain containment function of packaging in detail. (6)

- Q.6(a) Write a note on tetra pack aseptic processing and packaging. (6)
(b) Write a note on electro photography printing process. (6)

OR

- (b) Discuss in detail how inkjet printer works. (6)

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