

Seat No. _____

Enrolment No. _____

THE CHARUTAR VIDYAMANDAL UNIVERSITY
M.Sc. SURFACE COATING TECHNOLOGY – SEMESTER II
MAY 2022 (REGULAR) EXAMINATION

Course Code(s): 101470201

Course Title: TECHNOLOGY OF RESINS FOR SURFACE COATINGS - I

Total Printed Pages : 02

Date: 05/05/2022

Time: 02:00 PM to 04:00 PM

Maximum Marks: 60

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1 Answer the following MCQ's (12)

1. _____ is a resin secreted by the *Laccifer lacca*, on trees in the forests of India and Thailand
(a) Shellac (b) Dammar (c) Manila (d) Congo
2. High PAH Content (> 10%) in Coal Tar which is carcinogenic. What is the full form of PAH?
(a) Polycyclic aromatic hydrocarbon (b) Poly alicyclic hydrocarbon
(c) Polyacyclic aromatic hydrocarbon (d) Poly aliphatic hydrocarbon
3. Number Average Molecular weight of Bitumen is _____ gm/mole.
(a) 100 to 500 (b) 600 to 1500 (c) 1500 to 2500 (d) 2500 to 5000
4. _____ is used as a chain stopper in chain stop alkyd resin.
(a) Benzoic Acid (b) Fumaric Acid (c) Phthalic Acid (d) Maleic Acid
5. Which of the following alkyd is generally used as plasticizing alkyd in NC system?
(a) CG-32 (b) DCO 51 (c) DR-50 (d) LR-50
6. _____ is use to formulate 1K Polyester / Diisocyanate system with acceptable self-life by using the technique hindering the isocyanate.
(a) HDI (b) Cardura E-10 (c) VeoVa -10 (d) Caprolactum
7. _____ is not the curing agents of Saturated Polyester coating?
(a) Amino resin (b) Unsaturated Polyester (c) Polyisocyanate Resin (d) Epoxy Resin
8. In unsaturated polyester resins, the amount of _____ in proportion to the other diacids may range from 25 to 75 % on a molar basis, which influences the cross linking and governs the propertied of final network.
(a) Maleic Anhydride (b) Succinic Anhydride
(c) Phthalic Anhydride (d) Trimellitc Anhydride
9. _____ is use as initiator in unsaturated polyester resin.
(a) Cumene Peroxide (b) Hydroquinone (c) 4-tert-Butylcatechol (d) Styrene
10. The addition of _____ is recommended during end of the processing of Acrylic resin.
(a) Esterification (b) Etherification (c) De-esterification (d) Inhibitors
11. Which of the following is Epoxy-functional monomer?
(a) HEA (b) HEMA (c) GMA (d) Acrylic Acid
12. Resole are prepared using an F: P ratio of about _____ and reaction is brought about under highly _____ conditions.
(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. 2 Answer the following Short question (*Any Eight*) (16)

- (1) Why rosin cannot be used as such alone in coating and require modification.
- (2) Differentiate between Natural Gum and Natural Resin
- (3) Differentiate between Bitumen and Coal Tar
- (4) Calculate the amount of Pentaerythritol require to complete neutralization of 100 gms of Rosin. Consider 90% of acid in Rosin.

- (5) Match A | B
- | | |
|-----------------------------------|---|
| 1. Silicone Modified Alkyd Resin | a. Thixotropic and non-dripping properties |
| 2. Epoxy Modified Alkyd Resin | b. Heat and Weather Resistance properties |
| 3. Acrylated Modified Alkyd Resin | c. Adhesion and Corrosion Resistance properties |
| 4. Polyamide Modified Alkyd Resin | d. Surface drying and Hardness |
- (6) Write a brief note on Drip Feed Solution Polymerization Process for acrylic monomers.
 - (7) List out difference between Thermoplastic and Thermosetting acrylic.
 - (8) List out different phenolic compounds that can be used in synthesis of phenolic resin.
 - (9) Describe the reaction condition in synthesis of two grades of phenolic resin.
 - (10) Draw the structure of Urea, Melamine, Glycoluril and Benzoguanamine.

Q. 3 Explain the making of Resole and Rosin Modified Phenolic resin (RMP) along with its properties and uses. (08)

OR

Q. 3 Describe the possible reactions of Rosin. Write a note on making of Rosin Modified Maleic Resin along with its properties and uses. (08)

Q. 4 Calculate R, K, P, F_{avg} , Water of Reaction, Oil length, % Yield, Initial Acid Value and Hydroxyl Value in finished Short oil Alkyd resin. (08)

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

OR

Q. 4 List physically and chemically modified Alkyd resins. Explain in detail Urethane modified alkyd resins along with its uses. (08)

Q. 5 With a neat sketch explain the plant requirement for the production of Polyester resin. Describe the processing of polyester resin. (08)

OR

Q. 5 Give the causes and remedies for the following *any Four* in Polyester cook (08)
(a) Glycol Losses (b) Foaming (c) Gelation (d) Condenser Flooding (e) Long Processing Time.

Q. 6 Write the Advantage and Disadvantages of Emulsion Polymerization technique used for acrylic and vinyl monomers. (08)

OR

Q. 6 Write the factors influencing the choice of Alcohol used for Alkylation's in making of Amino resins. Write the reaction for Alkylation reaction. (08)

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- Q. 2** Answer the following Short question (Any Eight) (16)
- (1) What is Flooding & Floating?
 - (2) How plasticizer reduces intermolecular forces?
 - (3) For which primary reason most organic pigments are considered transparent?
 - (4) Write about cobalt metal as drier.
 - (5) Write structure of Indanthrone Blue & Violet 19.
 - (6) Classify Solvents by its solvency behaviour.
 - (7) What are the advantages of Solvents that evaporates quickly?
 - (8) Write about Zirconium metal as drier.
 - (9) What is 'Gibbs elasticity'?
 - (10) 500 gms of resin solution of 60 % solid content, how much (in gms) solvent required
- Q. 3** Why driers are not used in Latex Paints? Give detailed composition of Drier. Write all three manufacturing process of drier in details. (08)
- OR**
- Q. 3** a. Discuss about Wetting & Dispersing Agent for Water based & Solvent based coatings. (04)
b. What is Foam? How Foam is stabilized? What are the basic requirements of Defoamers? (04)
- Q. 4** Give Chemistry of Silicon additive as '*Surface additive*'. What is Intercoat adhesion? How silicone affects Intercoat adhesion? (08)
- OR**
- Q. 4** What are Solvents? Explain theory of solvency giving suitable formula. Explain solvency of two solvents with suitable example & Graph. (08)
- Q. 5** Write in details about Arylamide Yellow & Toluidine Red Pigment. (08)
- OR**
- Q. 5** Write short note on (08)
(1) Diarylide Yellow & Pyrazolone orange
(2) Azo bona - Toners
- Q. 6** What is 'Plasticizers'? Write its important properties. List the important characteristics of coatings which can be improved by using Plasticizers. (08)
- OR**
- Q. 6** Write in details about Phthalocyanine Blue & Phthalocyanine Green Pigments. (08)
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THE CHARUTAR VIDYA MANDAL UNIVERSITY
M.Sc. SURFACE COATING TECHNOLOGY – SEMESTER II
May 2022 (REGULAR) EXAMINATION

Course Code(s): 101470203

Course Title: Coating Properties & Analysis of Coating

Total Printed Pages : 02

Date: 07/05/2022

Time: 02.00 PM to 04.00 PM

Maximum Marks: 60

Instructions:

- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1 Answer the following MCQ's (12)

1. Hegmann gage test is used to find _____.
a) Fineness of Dispersion b) Viscosity c) % NVM d) None
2. Viscosity by Stormer viscometer is reported in _____ units
(a) Poise (b) Stokes (c) Krebs (d) Second
3. DFT can be estimated from _____ using the following equation.
(a) $DFT = (100 \times \%VS)/WFT$ (b) $DFT = (WFT)/(100\%VS)$
(c) $DFT = (WFT \times \%VS)/100$ (d) $DFT = (TC \times \%VS)/100$
4. In Ford Cup B4 the given quantity of paint is allowed to pass through a fixed size of Orifice i.e. ____ to determine its viscosity.
(a) 0.4 mm (b) 4 mm (c) 4 cm (d) 40 cm
5. %PVC in paint means _____
(a) % of Polyvinyl chloride (b) Mass of pigment
(c) Volume of pigment w.r.t to volume of resin (d) None
6. In paint can settling is observed due to _____
(a) Difference in specific gravity of pigment and resin
(b) Not using suitable and appropriate dose of dispersing agent
(c) Both a & b
(d) None
7. _____ is the test which reproduces the damage caused by sunlight, rain and dew.
(a) Humidity Test (b) Condensation Test
(c) Prohesion Test (d) QUV Accelerated UV Test
8. In dillant flow liquids, viscosity will _____
(a) Increase (b) Decrease (c) Remains same (d) None

9. In cross-cut test, 0 B rating indicates _____% area affected.
 a) Greater than 65% b) 35-65% c) less than 5% d) No area affected.
10. Which of the following is used to find WFT of coating?
 a) Inmont Gage b) Comb Gage c) Both a & b d) Ultrasonic Gage
11. For long term durability test, coating is to be scrutinized against _____.
 a) Heat b) Moisture c) Chemicals d) All
12. _____ is the test which reproduces the damage caused by marine water.
 (a) Humidity Test (b) Condensation Test
 (c) Prohesion Test (d) Salt spray test

Q. 2 Answer the following Short question (Any eight) (16)

- (1) List out different test to determine viscosity.
- (2) Describe full form of 1) SSPC 2) ASTM
- (3) Classify different hardness measurement test used in coating.
- (4) What is rheology?
- (5) What is the significance of %PVC in paint?
- (6) Classify type's hardness test in coatings.
- (7) List out destructive methods to measure DFT of coatings.
- (8) If volume solid of paint is 50%, and applied WFT is 50 μ , calculate DFT.
- (9) Define Newtonian and non-Newtonian liquid.
- (10) Classify types of rotating viscometer.

Q. 3 Describe the WFT measurements by Inmont Gage and Comb Gage. (08)

OR

Q. 3 i) Describe viscosity measurement by ford cup B4. (04)

ii) Describe in detail about Gardner Bubble Tube for measuring viscosity of resin. (04)

Q. 4 Define Hardness: Describe in detail Pendulum hardness method. (08)

OR

Q. 4 i) Write a note on impact resistance test. (04)

ii) Describe the conical mandrel test to check for elasticity of coatings.

Q. 5 Write a note on Dolly Pull of adhesion test.

OR

Q. 5 Describe Salt spray test in details.

Q. 6 Describe Humidity Test.

OR

Q. 6 Write a note on Orange Peel and Pinhole defects.