SC

SEAT No._____

No of printed pages: 2

[327]

SARDAR PATEL UNIVERSITY

M.Sc. 1st Semester (Surface Coating Technology) (CBCS) Examination

Thursday, 2nd November, 2017

PS01CSCT21: Chemistry & Technology of Oils and Polymer Sciences

Time: 10:00 am to 1:00 pm **Marks: 70**

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

2) Illustrate your answer whereas necessary with the help of heat sketches and chemical equation

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Q.1 Choose the correct Answer from the Followings:

1. Which of the following is drying oil? [01]

   a) Cottonseed oil b) Linseed oil

   c) Safflower oil d) Sunflower oil

2. Which of the following act as surface drier and through drier? [01]

   a) Pb b) Co

   c) Both a & b d) None of these

3. Initiator used in cationic polymerization is _____. [01]

   a) BF_3 b) Benzoyl peroxide

   c) KNH_2 d) none of these

4. AIBN is used as an initiator in which of the following mechanism of polymerization? [01]

   a) Anionic b) Cationic

   c) Free radical d) None of these

5. Cryoscopy is used to measure _____ average molecular weight. [01]

   a) Weight b) Number

   c) Viscosity d) Sedimentation

6. Which of the following technique is used to evaluate $\overline{Mn}$? [01]

   a) Membrane osmometry b) Light Scattering

   c) Sedimentation method d) Ubbelohde viscometery

7. Above glass transition temperature polymer will be converted to? [01]

   a) rubbery→glassy b) glassy→rubbery

   c) rubbery→leathery d) leathery→rubbery

8. Which of the following is/are the application of GC-MS? [01]

   a) Particle size analysis b) 'Tg' measurement

   c) Residual monomer d) All

Q.2 Answer the following short questions (any seven) [14]

1 State the major fatty acid constituents in Linseed oil and Tung oil.

2 How Iodine value can be used to classify types of oil.

3 Describe hydrolysis reaction of oils.

4 Define functionality of polymer giving suitable examples

5 How Ubbelohde viscometer is advantageous over Ostwald's viscometer?

6 Show that bifunctionality is the necessary requirement for polycondensation reaction.

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7 State the ingredients used in emulsion polymerization.

8 Even though castor oil is non-drying it can be converted to drying oil. Explain.

9 Discuss the significance of particle size in paint technology.

Q.3 a. List out the mechanism of curing of paint film and explain oxidative polymerization by hydroperoxide formation and Diels-Alder mechanism. **[06]**

Q.3 b. Describe the procedure to find hydroxyl value and acid value of oil. **[06]**

OR

Q.3 a. Write a note on blown oils, boiled oils and stand oils

Q.3 b. What is drier catalyst? How drier plays a role in primary and secondary oxidation reaction? **[06]**

Q.4 a. Describe the mechanism and kinetics for free-radical polymerization. **[06]**

Q.4 b. Write a note on a) Interfacial polycondensation b) Solid and gas phase polycondensation. **[06]**

OR

Q.4 a. Describe the kinetics of catalysed polycondensation.

Q.4 b. How stereo regularity can be controlled by Natta's co-ordination polymerization. **[06]**

Q.5 a. Discuss bulk and suspension polymerization techniques. **[06]**

Q.5 b. i) Derive the equation of $\overline{M}$ and $\overline{M}$ **[06]**

ii) Find out $\overline{M}$ and $\overline{M}$ for polymer consisting of 3 fractions with molecular weight 1 x 10^5, 2 x 10^5 and 3 x 10^5 gm/mol respectively. Mole fraction of the fraction are found to be 1,1 and 1 respectively.

OR

Q.5 a. How gel permeation chromatography can be used to estimate the molecular weight of polydispersed polymers

Q.5 b. i) State the principle of membrane osmometry to find molecular weight of the resin. **[06]**

ii) Define viscosity. Discuss its different forms and equation to find out molecular weight of the sample.

Q.6 a. Explain ring opening polymerization. Describe the mechanism of synthesis of nylon-6 from caprolactum by ring opening polymerization. **[06]**

Q.6 b. How can we determine T_g, T_c and T_m of a polymer **[06]**

OR

Q.6 a. Describe ICP-AES technique to analyse pigments in paint sample. **[06]**

Q.6 b. Describe the application of TGA to estimate volatile component and filler content giving suitable example.

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SARDAR PATEL UNIVERSITY

M.Sc. 1st Semester (Surface Coating Technology) (CBCS) Examination

Monday, 6th November, 2017

PS01CSCT22: Chemistry & Technology of Inorganic Pigments

Time: 10:00 am to 1:00 pm **Marks: 70**

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

2) Illustrate your answer whereas necessary with the help of heat sketches and chemical equation

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Q.1 Choose the correct Answer from the Followings:

1. Synthetic iron oxide were produced as a by-product of _____ **[01]**

   a) Benzene b) Aniline

   c) Nirtrobenzene d) Toluene

2. What is chemical composition of 'Barytes' **[01]**

   a) Aluminum Silicate b) Magnasium Silicate

   c) Sodium Hexa Meta Siilicate d) Barium Sulphate

3. Which is somewhat unique extender in view of its density (Highest)? **[01]**

   a) Natural Silica b) Talcum

   c) Calcium Carbonate d) Barytes

4. Which Extender widely used in "Traffic Paints" used? **[01]**

   a) Silica b) Kaolin

   c) Mica d) Calcium Carbonate

5. The sources of diatomaceous silica is _____ **[01]**

   a) Minerals b) Quartz

   c) Marine organisms d) Tripoli

6. Fibrous form of 'Talc'? **[01]**

   a) Asbestine b) Steatite

   c) Pyophylite d) Soapstone

7. "Persian Gulf Red" is the type of **[01]**

   a) Iron oxide yellow b) cadmium pigment

   c) Iron oxide red d) Red lead

8. Among following coating which one has highest PVC? **[01]**

   a) Enamel b) Wood Primer

   c) Clear Varnish d) Semi Glossy Enamel

Q.2 Answer the following short questions (any seven) **[14]**

1 Pyrogenic Silica gives thixotropic rheology – Justify

2 What is 'tie coat' recommended on clean steel?

3 What is corrosion? Write all factors needed to electro chemical reaction occur.

4 What is a sacrificial coating?

5 Why ultramarine blue is popular as "Laundry Blue"?

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6 How calcined china clay contributes to hiding?

7 Why aluminium paints should be supplied in separate container.

8 Which is known as "BLSC" as anticorrosive pigment?

9 Explain reducing strength and tinting strength

Q.3 a. What is hiding power? How it is measured? Explain about effect of PVC and Particle size on hiding power **[06]**

Q.3 b. Write about primrose chrome and scarlet chrome pigments **[06]**

OR

Q.3 a. Write in detail about manufacture of TiO_2 by Chloride process. How it is advantageous compare to sulphate process.

Q.3 b. Write about chromium oxide green and chrome iron green **[06]**

Q.4 a. Enlist different silica extenders. Give their composition. Explain in brief about Pyrogenic, Aerogels and Hydrogels silica. **[06]**

Q.4 b. Write about Bronze Powders and Zinc Dust as metallic pigments. **[06]**

OR

Q.4 a. Explain in brief about "kaolin" and calcined china clay giving composition. How calcined kaolin uses as opacifying extenders?

Q.4 b. Write a brief note on all grades of carbon black pigment. **[06]**

Q.5 a. Write a note on aluminium based metallic pigment. Explain the method of assessing Leafing property of aluminium pigment. **[06]**

Q.5 b. Write about white lead and Leaded Zinc Oxide Pigments **[06]**

OR

Q.5 a. Write about Pearlescent and phosphorescent pigments in details.

Q.5 b. Enlist different mechanism for protecting the metal from corrosion by using coatings. Write in detail oxidative passivation, Cathodic & anodic passivation **[06]**

Q.6 a. Explain solvent based and water based coatings. Discuss putty, Primer and top coat with respect to PVC. **[06]**

Q.6 b. Write about munsell and pantone colour order system. **[06]**

OR

Q.6 b. List the method of colour quantification. Explain CIE system in details. **[06]**

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SARDAR PATEL UNIVERSITY

M.Sc. 1st Semester (Surface Coating Technology) Examination (CBCS)

Friday, November 10, 2017

Time: 10:00 am to 1:00 pm

Course No. : PS01ESCT22

***Subject:* Fundamentals Mechanical Engineering for Coating Technologists**

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 The property of a material to absorb energy and plastically deform without fracturing is called (1)
(A) Ductility (B) Hardness
(C) Malleability (D) Toughness

2 A machining process in which material is removed by the action of hard abrasive particles (1)
(A) Foundry process (B) Abrasive machining process
(C) Forging process (D) Powder metallurgy

3 The gears used to transmit power between two perpendicular & non-intersecting shafts (1)
(A) Spur Gear (B) Helical Gear
(C) Bevel Gear (D) Worm Gear

4 Small components of complex shape and difficult to machine are can be manufactured by (1)
(A) Powder metallurgy (B) Forming process
(C) Drawing process (D) Extrusion process

5 A manufacturing process to make complicated shapes is called (1)
(A) Forging process (B) Casting process
(C) Welding process (D) Forming process

6 Clutch is used to (1)
(A) Modify motion of shafts (B) Permanent Joining of shafts
(C) Transmit motion from driving to driven shaft according to need (D) Braking action of shafts

7 The nozzles are used to (1)
(A) Control fluid flow (B) Reduce fluid flow
(C) direct or modify the flow of a fluid (D) increase fluid flow

8 The technique to seal the gap formed between a rotary shaft and a stationary stuffing box is (1)
(A) Mechanical seal (B) Riveted joints
(C) Packing (D) Gasket

Q.2 **Attempt *any Seven* Questions:** (14)

(a) Define these mechanical properties: Brittleness and Elasticity.
(b) What is tail stock in a lathe? What are its functions?
(c) What are the characteristics of ceramic materials?
(d) Compare between flat belt and V belt drive.
(e) What is Grinding operation? Why it is considered as finishing operation?
(f) Define Mechanical seal. What is its function?
(g) Brief the types of sand binders in casting process? What is its role in molding sand?
(h) What is hydraulic press? What are the applications of it?
(i) Explain various die bending operations in sheet metal forming process.

(P.T.O.)

Q.3 a	Compare all characteristics of Belt drive and Chain drive transmission.	(6)
Q.3 b	What is the function of clutch? Draw line diagram of disk type clutch.	(6)
	OR	
Q.3 a	Show line diagrams of straight turning, taper turning, facing, and drilling operations on lathe machine, showing direction of speed, feed and depth of cut.	(6)
Q.3 b	What are the characteristics of gear drive transmission? (Advantages, disadvantages & applications)	(6)
Q.4 a	What are the properties of moulding sand in foundry process? Explain any two.	(6)
Q.4 b	Compare major characteristics between two basic metal working processes; Cold working and Hot working process.	(6)
	OR	
Q.4 a	Explain with sketch: Shrinkage allowance and Machining allowances given on pattern.	(6)
Q.4 b	Explain metal forging process with its advantages and limitations.	(6)
Q.5 a	Explain stepwise process of Powder metallurgy. Also draw block diagram.	(6)
Q.5 b	What are the advantages and disadvantages of welded joint?	(6)
	OR	
Q.5 a	What is airless spraying? What are the advantages of it?	(6)
Q.5 b	Brief various sheet metal operations with diagram..	(6)
Q.6 a	Compare working characteristics of hydraulic systems versus pneumatic systems.	(6)
Q.6 b	Draw line diagram of spraying gun with labeling of all components. Brief about its working.	(6)
	OR	
Q.6 b	What are the advantages, disadvantages and safety precautions required for using Robots?	(6)

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