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SARDAR PATEL UNIVERSITY

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

Saturday, December 1, 2012

Time: 02:30 P~~to 5:30 pm

Course No. : PS03CSCT02

Subject: Technology of Paint Manufacturing

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

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Q.1(1) Electrical double layer thickness does not depend on _____ .   (1)

(A) Hardness of water   (B) Isoelectric point

(C) Viscosity of water   (D) Dielectric constant of water

(2) Generally the volume occupied by mill base is ___ of the total ball mill volume.   (1)

(A) 20%   (B) 30%

(C) 40%   (D) 60%

(3) General composition of Ottawa sand is _____ .   (1)

(A) Aluminium oxide   (B) Silica

(C) Zirconia   (D) Silicate

(4) Pick the odd one with respect to type of equipment.   (1)

(A) HSDD   (B) Kinetic Dispersion mill

(C) Bead Mill   (D) Ball Mill

(5) Which grinding media should be used for grinding Iron oxide pigments?   (1)

(A) Glass   (B) Ceramic

(C) Metallic   (D) Aluminium silicate beads

(6) Which equipment have highest RTM   (1)

(A) HSDD   (B) Attritor

(C) Sand mill   (D) Ball mill

(7) OEE is a key metric for   (1)

(A) Planned maintenance   (B) Focused Improvement

(C) Autonomous maintenance   (D) Maintenance prevention

(8) The pigment-binder ratio for Primer is normally in the range of _____ .   (1)

(A) 2.0 to 4.0 :1.0   (B) 6.0 to 8.0 :1.0

(C) 4.0 to 6.0 :1.0   (D) 0.95 to 1.0 :1.0

Q.2 Answer **any seven** of the following   (14)

1 Daniel Wet point and Flow point.

2 Low particle size latex particles give higher LCPVC- Justify

3 With neat sketch explain the working of TRM.

4 Advantages and disadvantages of ball mill.

5 What is air pollution? Give sources of air pollution during paint manufacturing.

6 What are VOCs and how they affect the environment?

7 Define TPM and enlist the pillars of TPM.

8 What are limitations of High speed disk disperser?

9 Write in brief about HAPs.

Q.3(a) Formulate glossy white stoving enamel by using short oil alkyd resin (60%NV, Density=0.98 Kg/L) (6) and Melamine formaldehyde resin (60%NV, Density=1.03 Kg/L) as binder and Rutile TiO_2 as pigment (Sp. Gravity = 4.1). Ratio of Alkyd to Amino resin should be 4:1 on weight basis. Select suitable additives & solvents as needed. Pigmentation should not exceed 20%. Calculate theoretical %NVM, %Non Volatile by Volume, Pigment-Binder ratio and density of the formulation.

(b) What are PVC and CPVC? Explain the effect of CPVC on different properties of pigmented (6) coatings?

OR

(b) What is LCPVC? How particle size of latex, glass transition temperature (Tg) of latex and coalescing (6) agent affect LCPVC?

Q.4(a) Write the steps of pigment dispersion process & explain about pigment dispersion stabilization (6) mechanism in detail.

(b) List the different factors affecting grinding efficiency of Ball mill. Explain grinding media & mill base (6) factors in detail.

OR

(b) Give detail account on (6)
    i.   Effect of Rheology on efficiency of HSDD
    ii.   Design and operation of Sand Mill with neat sketch.

Q.5(a) Write note on **any two** (6)
    i.   Basket Mill
    ii.   Horizontal agitated media mill
    iii. Twin Shaft Disperser

(b) What is mill base let down? Why stabilization should be done before Mill base letdown? Write about (6) different problems arising from improper letdown? What are the practical recommendations for optimum letdown conditions?

OR

(b) Explain the different factors which need to be considered while selecting a location of plant for paint (6) industry.

Q.6(a) Write note on 5S. (6)

(b) Give detail account on (6)
    i.   OEE
    ii.   Production System & Different types of production system

OR

(b) Explain **any two** of the following (6)
    i.   What is production planning and control? Give its benefits.
    ii.   What is fire and explosion hazard? Give the sources of fire & explosion hazard in paint industry? How it can be prevented?
    iii. Give brief account of various packaging materials and packaging machines used in paint industry.