[97]   **SARDAR PATEL UNIVERSITY**
M.Sc. 1ˢᵗ Semester (Surface Coating Technology) Examination (CBCS)
Monday, March 25ᵗʰ, 2019
Time: 10:00 am to 1:00 pm
Course No.: PS01CSCT23
Subject: Surface Chemistry & Surface Engineering

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)   When the angle of contact between solid and liquid is 90°, then _____.   (1)
   A. Cohesive forces > Adhesive forces   B. Cohesive forces < Adhesive forces
   C. Cohesive forces = Adhesive forces   D. Cohesive forces >> Adhesive forces

(2)   Surface tension of liquid is independent of _____.   (1)
   A. temperature of liquid   B. area of the liquid surface
   C. nature of liquid   D. impurities present in the liquid

(3)   Which of the following contact angle (θ) will ensure best wetting of solid surface by given   (1)
   liquid?
   A. θ = 120°   B. θ = 90°
   C. θ = 180°   D. θ = 75°

(4)   Which of the following surfactants is ionic surfactant?   (1)
   A. Octaethylene glycol sterate   B. Sodium Lauryl sulphonate
   C. Alcohol ethoxylate   D. Alkanolamide

(5)   High decibel level sound is produced in   (1)
   A. Powder flame spray   B. High velocity oxy fuel
   C. Plasma spray   D. Detonation Gun

(6)   Supersonic speed of particle is achieved in   (1)
   A. Cold Gas Dynamic spray   B. Electro-plating
   C. Wire arc spray   D. Powder flame spray

(7)   Combustion of fuel takes place in closed chamber in   (1)
   A. Plasma spray   B. High velocity oxy fuel
   C. Powder flame spray   D. Wire arc spray

(8)   Particle speed in case of wire flame spray method is approximately   (1)
   A. 3 m/sec   B. 30 m/sec
   C. 300 m/sec   D. 3000 m/sec

Q.2 Answer **any seven** of the following $\qquad$ (14)
1 What is Surface tension? List the methods used to measure surface tension.
2 Explain in brief about Critical Solid Surface tension.
3 Twelve drops of paint solvent, collected over a 5-min period from a drop weight tensiometer (critical outside bottom radius 0.274 cm) weigh 0.362 g. Calculate the solvent surface tension.
4 Define Cloud Point & Kraft Point.
5 What is HLB value and why it is important?
6 Discuss the defects observed in thermally sprayed coatings.
7 Describe any one method of testing thermally sprayed coatings.
8 Name four properties that can be improved by surface engineering.
9 Briefly explain bonding in Diamond Like Carbon Film?

Q.3(a) Derive equation for work of adhesion if solid surface is completely smooth and if complete adhesion is attained. (6)

(b) What is critical micelle concentration (CMC)? Explain different factors affect CMC of surfactant. (6)

OR

(b) Explain in detail about capillary tube method for determining surface tension. (6)

Q.4(a) Discuss the properties of surfactant in detail. (6)
(b) Write a note on different application of surfactant. (6)

OR

(b) What are emulsions and how they are formed? Differentiate between O/W & W/O types of emulsions? (6)

Q.5(a) Explain the process of electroplating with neat sketch. What are limitations and capabilities of the process? (6)

(b) Describe the process of Wire arc flame spray with the help of neat sketch. (6)

OR

(b) Explain the process of High Velocity Oxy Fuel spray with the help of neat sketch. (6)

Q.6(a) Discuss different methods of surface preparation of substrate before coating. (6)

(b) Explain the process of Cold gas dynamic spray with the help of neat sketch. (6)

OR

(b) Describe the process of Micro Arc Oxidation indicating its applications and limitations. (6)

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