

CVM UNIVERSITY

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

Friday, February 26th 2021

Time: 10:00 am to 12:00 pm

Course No.: 101470103

Subject: Surface Chemistry & Surface Engineering

Total Marks: 60

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.(a) 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 \gg Adhesive forces
- (2) A surfactant which hydrates in water, primarily by hydrogen bonding through its oxygen content is called _____. (1)
- A. anionic surfactant B. cationic surfactant
C. nonionic surfactant D. amphoteric surfactant
- (3) If dispersion of surfactant in water is immiscible, what will be its HLB? (1)
- A. 1 – 4 B. 8 - 10
C. 11 - 12 D. 13 - 14
- (4) Surface tension of liquid is independent of _____. (1)
- A. temperature of the liquid B. area of the liquid surface
C. nature of the liquid D. impurities present in the liquid
- (5) Adhesion strength of thermally sprayed coating is affected by (1)
- A. Porosities B. Unmelts
C. Oxidation of material being coated D. All of the above
- (6) The process which requires sound proof chamber for coating is (1)
- A. Chemical vapor deposition B. Electro-plating
C. Detonation Gun process D. Plasma coating
- (7) Process in which the material being coated is converted to ion before depositing (1)
- A. Physical Vapor coating B. Electro-plating
C. High Velocity Oxy-fuel D. Diamond like carbon coating
- (8) Sputtering process of evaporating atom from target surface is used in (1)
- A. Thermally sprayed coating B. Electro-plating
C. Physical vapor deposition D. Cold gas dynamic spray method

Q.1.(b) **Attempt the following questions as True / False.**

(08)

- 1 The degree of roughness (i) for liquids $i = 0$
- 2 Cohesive forces are the forces acting between molecules of same material.
- 3 A surfactant with a very large HLB value is expected to function as a solubility enhancer.
- 4 A surfactant used for antifoaming agent should have HLB value in the range of 2 to 3.
- 5 Sputtering process of evaporating atom from target surface is used in Physical vapor deposition
- 6 PVD is not effective to improve oxidation resistance.
- 7 The most effective way to improve the coating-substrate adhesion in PVD is by heating the substrate.
- 8 Micelles behave as colloids only when concentration is greater than CMC.

Q.2 Answer **Any Six** of the following

(12)

- 1 What is Surface tension? List the methods used to measure surface tension.
- 2 What are emulsions and how they are formed?
- 3 Define Cloud Point & Kraft Point.
- 4 What is HLB value and why it is important?
- 5 Define Surface Engineering. Write its advantages.
- 6 Differentiate between physical and chemical modification process.
- 7 Write advantages and application of CVD process.
- 8 Compare between evaporation and sputtering process of PVD.

Q.3 Derive equation for work of adhesion if solid surface is completely smooth and if complete adhesion is attained. (8)

OR

Q.3 Write a note on surface tension measurement by drop weight method. (8)

Q.4 What is critical micelle concentration (CMC)? Explain different factors affect CMC of surfactant. (8)

OR

Q.4 Write a note on different application of surfactant. (8)

Q.5 Write a note on thermal evaporation process of PVD. (8)

OR

Q.5 Write a note on electron beam evaporation process of PVD. (8)

Q.6 Write a note on Chemical Vapor Deposition. (8)

OR

Q.6 Write a note on electro-chemical conversion method of coating. (8)
