

B.E. METALLURGICAL ENGINEERING THIRD YEAR SECOND SEMESTER - 2025

Ref. No. : Ex/Met/ES/H/T/325/2025

Subject: SURFACE ENGINEERING & COATING TECHNOLOGY (HONS.) Time: 3 hrs.

CO I: (Answer any 2 questions from CO I)

(10*2=20)

1. What is surface engineering? What are the main goals of surface engineering? What are some examples of materials that benefit from surface engineering? What are some real-world applications of surface engineering? How does the surface morphology affect material properties? 2+2+2+2+2=10
2. How can you differentiate the covalent bonding and metallic bonding in engineering material? Classify the surface engineering? 5+5=10
3. How the surface energy and surface tension influence the wettability properties of the surface of an engineering material? Explain different types of wear observed in surface engineering? 5+5=10

CO II: (Answer any 2 questions from CO II)

(10*2=20)

4. How galvanic cell can be form? What are the differences between oxidation and corrosion? 5+5=10
5. Explain: Pitting corrosion and Erosion corrosion. 5+5=10
6. Why kinetics of oxidation is very important for engineering requirements? Explain. How stress corrosion cracking (SCC) is occurs explain? 5+5=10

CO III: (Answer any 3 questions from CO III)

(10*3=30)

7. What are the main benefits of using protective coatings? How are protective coatings applied? What factors affect the selection of a protective coating? What are the applications of Cadmium (Cd) as metallic coating? What is cladding process? 2+2+2+2+2=10
8. How coated surface can developed by flame spray coating process? What are the advantages and disadvantages of flame spray coating process? What are the differences between flam spray coating and HVOF coating process? 2+5+3=10
9. What are the principles of plasma spray coating? What are the key factors affecting the plasma spray process? 5+5=10
10. What are the key aspects of cold spray coating? What are the advantages of cold spray coating? 5+5=10

[Turn over

CO IV: (Answer any 3 questions from CO IV)

(10*3=30)

11. What is tribology? Explain with various examples. How does the type of lubrication (e.g., solid, liquid, gas) affect friction and wear? 5+5=10
12. What is ion implantation process? What are the applications of ion implantation in semiconductor device fabrication and metal finishing? 2+4+4=10
13. Explain the mechanism of surface modification by electron beam? What are the applications of electron beam surface coating? 5+5=10
14. What is the principle of laser surface treatment? What are the classifications of laser surface treatment process, explain? 5+5=10