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Question Paper Code : 20761

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fifth Semester

Manufacturing Engineering

CME 397 – SURFACE ENGINEERING

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(Common to: Mechanical Engineering and Production Engineering)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term 'Friction'.
2. Give a few engineering applications for which establishment of frictional forces between them and their mating surfaces are essential.
3. What is meant by two body wear and three body wear.
4. List the important characteristics of low stress abrasion wear.
5. What is crevice corrosion? Give one example.
6. Give examples for corrosion resistant materials.
7. List the importance of surface coating on engineering materials.
8. Give any two applications for thermal spray coating.
9. Suggest any two special alloys for wear resistance application.
10. List the importance of ceramic materials in surface engineering.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss the different types of friction with suitable applications.

Or

- (b) Explain the methods to control extreme friction in engineering application with suitable examples.

12. (a) Discuss the methods to measure the adhesive wear properties of material with ASTM specification.

Or

- (b) (i) Explain the mechanism of Fretting wear that takes place in movement of two solid surfaces. Also list the causes and remedial action for fretting wear in detail. (8)

- (ii) Differentiate between abrasive wear and Erosive wear mechanism. (5)

13. (a) Explain the concept of passivity with neat sketches and comment about Icorr and Ecorr with their significance.

Or

- (b) (i) Differentiate and discuss the Cathodic protection and anodic protection. (8)

- (ii) Briefly discuss the methods to prevent the materials from corrosion (5)

14. (a) Discuss the different types of PVD coating methods, their principles, advantages, limitations and applications.

Or

- (b) Describe the principles and procedure of chemical vapour deposition (CVD) method in detail. Also list their applications, advantages and disadvantages.

15. (a) Discuss the properties and applications of any three nickel base alloys used for wear resistance applications.

Or

- (b) What is the role of Bio materials in surface engineering? Discuss the importance and applications of biomaterials.

PART C — (1 × 15 = 15 marks)

16. (a) An electronic device substrate is to be coated with 10 micron thick ceramic coating. Suggest a suitable technique for this application and discuss the process briefly.

Or

- (b) Analyze in detail the types of wear that takes place in
- (i) Two metallic gears operating at high speeds and loads (8)
 - (ii) Propeller of a hydroelectric power plant turbines (7)



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