

Total No. of Questions : 8]

SEAT No. :

**P737**

[Total No. of Pages : 2

**[5870]-1030**

**T.E. (Mechanical)**

**SURFACE ENGINEERING**

**(2019 Pattern) (Semester - II) (Elective - II) (302052B)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

**Instructions to the candidates:**

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

- Q1)** a) Compare Carburizing and Nitriding processes. [6]  
b) Define Case Depth. List techniques of case depth measurement. Explain any two techniques with suitable sketches. [6]  
c) Explain Induction Hardening with neat and labeled diagram. State limitations and at least two applications of Induction Hardening. [6]

OR

- Q2)** a) State Ficks law of diffusion. List two applications of Ficks law of diffusion. [6]  
b) Comment with clarification on suitability of Plain Carbon Steels and Alloy Steels for Nitriding process. [6]  
c) Describe laser hardening process. List advantages and applications. [6]

- Q3)** a) Describe electro less coating? State advantages, limitations and applications of electro less coatings. [6]  
b) What is the necessity of Ion Implantation? State advantages and limitations. [6]  
c) Write in brief principle of Sol gel coating technology. List applications of Sol gel coating technology. [5]

OR

- Q4)** a) Discuss conversion coatings for corrosion resistance with at least two examples. [6]  
b) Describe method of dielectric coatings of Si-C alloy films. [6]  
c) Write short note on laser alloying. [5]

**P.T.O.**

- Q5)** a) List techniques for applying PVD coatings. Describe any two techniques of applying physical vapour deposition techniques. [6]  
b) Explain steps of Hot dipping operations? [6]  
c) What is the purpose of Hardfacing? Explain thermal spray technique of Hardfacing with neat diagram and suitable example. [6]

OR

- Q6)** a) Categories clad metal systems. Write short note on any two clad metal systems. [6]  
b) Write at least two examples of Metal Coating, Inorganic coating and Organic coating each. [6]  
c) Describe with neat diagram application of inorganic coatings by spraying. [6]

- Q7)** a) Describe with neat diagram microscopy for surface imaging by force. [6]  
b) Discuss various methods of surface roughness measurement. [6]  
c) Describe any one method of residual stress measurement. [5]

OR

- Q8)** a) List coatings defects. Describe any three along with corrective measures. [6]  
b) List methods of coating thickness measurement. Write steps of coating thickness measurement by any one method. [6]  
c) Compare scanning probe microscopy and atomic force microscopy. [5]

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