P737

[5870]-1030 T.E. (Mechanical)

SURFACE ENGINEERING

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

Time : 2¹/₂ *Hours*]

[*Max. Marks* : 70

[6]

Instructions to the condidates:

- Answer 0.1 or 0.2, 0.3 or 0.4, 0.5 or 0.6, 0.7 or 0.8. 1)
- 2) Neat diagrams' must be drawn wherever necessary.
- Figures to the right side indicate full marks. 3)

Q1) a) Compare Carburizing and Nitriding processes.

- b) Devine 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]**

- State Ficks law of diffusion. List two applications of Ficks law of *Q*2) a) diffusion. [6]
 - b) Comment with clarification on suitability of Plain Carbon Steels and Alloy Steels for Nitriding process.
 - c) Describe laser hardening process. List advantages and applications. [6]
- Describe electro less coating? State advantages, limitations and (03)a) applications of electro less coatings. [6]
 - b) What is the necessity of Ion Implantation? State advantages and limitations. [6]
 - Write in brief principle of Sol gel coating technology. List applications c) of Sol gel coating technology. [5]

OR

- Discuss conversion coatings for corrosion resistance with at least two **04**) a) examples. [6]
 - b) Describe method of dielectric coatings of Si-C alloy films. [6]
 - c) Write short note on laser alloying. [5]

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- a) List techniques for applying PVD coatings. Describe any two techniques **Q**5) 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

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

Q7) Describe with neat diagram microscopy for surface imaging by force. a) [6]

- b) Discuss various methods of surface roughness measurement. [6]
- c) Describe any one method of residual stress measurement. [5]
- List coatings defects. Describe any three along with corrective measures. **08**) a)
 - b) List methods of coating thickness measurement. Write steps of coating thickness measurement by any one method.
 - nicros Compare scanning probe microscopy and atomic force microscopy [5] c)