

Total No. of Questions : 8]

SEAT No. :

P7664

[Total No. of Pages : 2

[6180]-188

T.E. (Mechanical)

SURFACE ENGINEERING

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

Q1) a) State Fick's law. Explain the importance of each term in an equation of Fick's law? [6]

b) What is the importance of case depth measurement? Discuss steps in ASTM E1077-01 Depth of carburization. [6]

c) Explain the process of Nitriding? Compare it with Carbonitriding. [6]

OR

Q2) a) State factors that governs depth of carburization. [6]

b) Compare Induction Hardening & Flame Hardening. [6]

c) Write short note on Laser Hardening. [6]

Q3) a) Explain with neat diagram Ion beam surface treatment? [6]

b) Explain laser surface alloying? Why need of this technology is increasing day by day? [6]

c) How nitrides, silicides and carbides help in corrosion resistance coating? Explain with example of steel or Stainless steel? [5]

OR

Q4) a) Describe sol-gel coating technology. [6]

b) Differentiate Electrolysis coating and Electroless coating. [6]

c) Classify Metallic and Non-Metallic coatings in detail. [5]

P.T.O.

- Q5)** a) Differentiate in metal, inorganic and organic coatings with (application, effectiveness, cost and time). [6]
- b) Explain the process of cladding. List applications of it? [6]
- c) List steps of surface preparation for organic coatings? How better surface preparation helps in getting better coating results? [6]

OR

- Q6)** a) Write short note on Cold spray coating. [6]
- b) Compare hot dipping and vapor deposition process of metal coating? [6]
- c) Define the following processes with examples [6]
- i) Noble Coatings
- ii) Sacrificial Coatings

- Q7)** a) Define Crawling; Flooding, wrinkling, Bubbling. [6]
- b) Why does embrittlement of coating occurs? State parameters that needs to be controlled to remove embrittlement. [6]
- c) Write a short note on Atomic force microscopy with a neat sketch. [5]

OR

- Q8)** a) What is Blushing, foaming? How does these defects arise, mention steps to remove these defects? [6]
- b) List the non-destructive methods of measuring film thickness. How Film thickness can be measured using eddy current and ultrasound techniques? [6]
- c) Describe briefly the measurement of porosity of surface coating. [5]

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