Total No. of Questions : 8]

SEAT No. :

PF5030

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T.E. (Mechanical Engineering)

SURFACE ENGINEERING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) List different Surface hardening processes. Write one application of each surface hardening process enlisted. **[6]**

b) State Fick"s law. What are major points for formula of this law? **[6]**

c) What is Carburizing, with classification of Carburizing, discuss how atmosphere of process affect diffusion? **[6]**

OR

Q2) a) Compare Induction Hardening & Flame Hardening. **[6]**

b) Explain process of Nitriding? Compare it with Carbonitriding. **[6]**

c) Briefly describe any one process of the following: **[6]**

i) Plasma Nitriding

ii) Laser Hardening.

Q3) a) Differentiate Electrolysis coating and Electroless coating. **[6]**

b) How nitrides, silicides, and carbides help in corrosion resistance coating? Explain with example of steel or Stainless steel? **[6]**

c) Describe sol-gel coating technology. **[5]**

OR

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Q4) a) Explain laser surface alloying? Why need of this technology is increasing day by day? **[6]**

b) Explain with neat diagram ion beam surface treatment. **[6]**

c) With suitable example discuss need for coating for wear resistance. **[5]**

Q5) a) Explain importance of coating and Surface preparation for coating. **[6]**

b) Discuss processes of Electro-deposition with neat diagram? **[6]**

c) Highlight need of coatings for aerospace and aircrafts. List few applications of it? **[6]**

OR

Q6) a) Differentiate in metal, inorganic and organic coatings with respect to Application, effectiveness, cost and time). **[6]**

b) Explain process of cladding; List application of it. **[6]**

c) Briefly describe Coatings for high temperature. **[6]**

Q7) a) Name the different types of Coating Defects. Mention the causes and remedies of any two. **[6]**

b) Define Crawling, ; Flooding, wrinkling, Bubbling. **[6]**

c) Why embrittlement of coating occurs? Which parameters will be able to remove embrittlement? **[5]**

OR

Q8) a) List process of measurement of coating thickness? Why thickness measurement is essential in coating process? **[6]**

b) What is Blushing, foaming? How this defect arises, mention steps to remove these defects? **[6]**

c) Explain how measurement of residual stress and stability is carried out? **[5]**



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