Registration No: | | | | | | | | | | |

Total Number of Pages: 01

B.Tech.
PEMT5402

7th Semester Regular / Back Examination 2017-18
Surface Engineering
BRANCH: METTA, MME
Time: 3 Hours
Max Marks: 70
Q.CODE: B438

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) Why iron and chromium cannot be deposited as an alloy under normal condition?
b) What is the scope of surface engineering in ceramics and polymers?
c) What is the difference between carbo – nitriding and Nitro – carburizing?
d) Write down the CVD reactions for the deposition of Si and SiO_2?
e) In between the APCVD and LPCVD process, which one is the mass transfer controlled and which one is the reaction rate controlled and why ?
f) Briefly explain surface treatment of a metal bi ion implantation?
g) What are the advantages of Cu deposited by electrochemical method to a Cu deposited by other methods?
h) Write down the advantages of cold wall reactor over hot wall reactor in a CVD process?
i) For deposition of TiN by sputter coating method from a Ti target material which gas should be used as a plasma generating gas and why?
j) If an aircraft flies through a dust cloud which type of wear process generally occurs and how can you improve wear resistance of the affected part?

Q2 **a)** Explain chromate coating with its reactions. Also write its applications? **(5)**
b) What do you understand by phosphating? Also describe the general phosphating reaction for coating formation? **(5)**

Q3 **a)** What do you understand by electroplating? What is the purpose of electroplating? **(5)**
b) What should be the various characteristics of an electrolytic solution? **(5)**

Q4 **a)** Explain electroplating of Nickel by Watt's solution and role of different constituents? **(5)**
b) Explain electro-deposition of Tin using both methods(acid and alkaline)? **(5)**

Q5 **a)** Write plating solution and operating condition of cyanide bath for copper plating?What are the troubles with cyanide bath for copper plating? **(5)**
b) Explain chemical vapour deposition technique. What are the various chemical reactions in CVD? **(5)**

Q6 **a)** Give a comparison between LCVD (laser CVD & PECVD(plasma enhanced CVD)? Write a short note on laser CVD. **(5)**
b) What is sputtering? Write its types. Explain any one method of sputtering? **(5)**

Q7 **a)** Explain ion implantation process with its collision cascade process? Explain any one method of measuring coating thickness? **(5)**
b) What do you understand by PVD? What are the various stages in growth of film formation by PVD? **(5)**

Q8 **Write short notes on any TWO :** **(5x2)**

a) Electro - less Plaiting
b) Thermal Evaporation
c) Carbo - nitriding