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

Total Number of Pages : 02 **B.Tech.**

PCMT4203

4th Semester Back Examination 2017-18
PRINCIPLES OF EXTRACTIVE METALLURGY
BRANCH : METTA, MME
Time : 3 Hours
Max Marks : 70
Q.CODE : C1146

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

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

a) Difference between electro winning and electro refining.
b) What is Elution?
c) What is distillation technique of refining.
d) Find out the equilibrium constant(K) for the reaction
2Si (metal) + 2O(metal = SiO_2 slag).
e) What is leaching process?
f) Write is electrode potential.
g) What do you mean by activation energy and how this concept is used in extraction of metals?
h) What is percolation leaching?
i) WHAT IS Equivalent mass of an element?
j) Why last stage of refining is always difficult?

Q2 **a)** What is the basis of electrometallurgy and explain electrolytic method of refining of metals with a suitable diagram? **(5)**

b) Draw a curve(graph) showing different stages of fluidized bed roasting and it must show minimum velocity required for complete fluidization. **(5)**

Q3 **a)** Why controlled oxidation (controlled roasting) is required for copper and nickel and antimony ores and explain why we cannot go for complete oxidation like in case of zinc ore and lead ore? **(5)**

b) A current of 10 amperes was passed for 15 minutes in a solution of silver nitrate ($AgNO_3$). The mass of silver deposited was found to be 1.0062×10^{-2} Kg. Calculate the electrochemical equivalent (Z) of Ag metal. **(5)**

Q4 **a)** Role of bacteria in bacterial leaching? **(5)**

b) Discuss the basic approaches of refining. **(5)**

Q5 **a)** Describe Ellingham diagram. What are the limitations of this diagram? **(5)**

b) Would an atmosphere containing 15 % Co2, 5% Co, 80 % N2 oxidise nickel at 1000K. [2.5 MARKS] **(5)**
Given :
Ni (s) + ½ O2 (g) = Nio (S) Ke' = 5.76×10^7 (at 1000 k)
Co (g) + ½ O2 (g) = Co2 (g) Ke ''= 1.68×10^{10} (at 1000 k)

Q6 **a)** Discuss ion exchange technique with suitable diagram and example. **(5)**

b) What are advantages of hydrometallurgy process over pyro metallurgy? **(5)**

Q7 Explain all the possible problems you will face if you are extracting metals out of more stable oxides like oxides of Ti, Nb, Ta, Mg, Mn ,Al. and write all the possible solutions .And Can we extract metals direct from sulphide ore if yes give few examples as well as methods. **(10)**

Q8 **Write short answer on any TWO :** **(5 x 2)**

a) Matte smelting

b) Flash smelting

c) Solvent extraction

d) Metallo-thermic reduction