Question Paper

Exam Date & Time: 01-Jan-2019 (08:30 AM - 11:30 AM)

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

FIRST SEMESTER B.TECH END SEMESTER MAKE UP EXAMINATIONS, DEC. 2018

Engineering Chemistry [CHM 1051 - 2018 -CHM]

Marks: 50 **Duration: 180 mins.**

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)	A)	(i) Describe the construction and working of lead acid battery. What are the advantages of fuel batteries over a conventional battery? (ii)With the necessary equations describe the electro-less plating of copper. Mention its advantages.	(5)
	B)	List any two differences between the following: a) Ionic and covalent solids b) Physical and chemical vapor deposition c) Inter molecular and intra molecular hydrogen bonding	(3)
	C)	Derive Beer Lamberts law and mention two of its limitations.	(2)
2)	A)	(i) Explain the classification and any two applications of refractory materials. (ii) Define the terms a) functionality b) degree of polymerization A polymer sample which has 20 % molecules with a molecular mass of 20000 units, 50 % molecules having a molecular mass of 30000 while the remaining 30 % have a molecular mass of 40000 units. Calculate the number-average and weight- average molecular mass of polymer.	(5)
	B)	(i) Give reason: Potentiometric method is employed for the precise measurement of EMF of a cell. (ii) In Poggendorff's compensation method, null deflection showed for standard cell of 2V and test cell are at 65 cm and 48 cm respectively. Calculate the EMF of the test cell. If the cell reaction involves 2 electron transfer, calculate the enthalpy change and entropy change for the test cell at 295 K (temperature coefficient of the test cell is	(3)

$6.39 \times 10\text{-}4\ VK^{-1}$).

C) Why galvanic series is preferred to EMF series in corrosion studies? (2)

3) A) (i) What is the principle of colorimetry? Explain how the concentration of iron in a solution is determined using this method? (5)
(ii) Explain the Fischer- Tropsch Process for the production of synthetic petrol with a neat diagram.

B) Explain the analytical method for the determination of carbon and hydrogen in a coal sample. (3)

C) Write any two merits and two demerits of instrumental methods of analysis. (2)

4) A) (i)Discuss the importance of chemical resistance and elasticity of polymers in day-to-day life. (5)
(ii)Outline the classification of ceramics.

B) Justify the following statements: (3)
(i) Steel pipe in a large copper tank corrodes causing rapid destruction.
(ii) Smaller the anode -to-cathode area ratio, higher will be the corrosion rate.
(iii) Accelerated corrosion takes place in aerated acid solutions.

C) Write the balanced half-cell reactions and the cell representation for the galvanic cells with theoretical EMF of 2.0V and 0.63V at 298K, constructed by using the following electrodes. The standard reduction potential (in V) of each electrode is given below. (2)

Zn^{2+}	Cr^{3+}	Al^{3+}	Pb^{2+}	Cu^{2+}	Mg^{2+}	Ni^{2+}	Fe^{2+}
-0.76	-0.74	-1.66	-0.13	0.34	-2.38	-0.23	-0.41

5) A) (i) Mention the principle of following methods of corrosion control: (5)
a) Cathodic protection methods b) Anodic protection c) Corrosion inhibitors
(ii) Explain the mechanism of caustic embrittlement in mild steel.

B) Give reasons for the following: (3)

a) Carbon fibre is a high performance material
b) Kevlar composites are sensitive to the environment
c) Poly vinyl chloride is tougher and stronger than polyethylene

C) Illustrate the inter-granular corrosion with a suitable example. (2)

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