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Reg. No. : | | | | | | | | | | |

Question Paper Code: 51004

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

First Semester

Mechanical Engineering

15UCY104 - ENGINEERING CHEMISTRY

(Common to Chemical Engineering)

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. According to Fajan's rule, the increasing order of covalent character for Licl,Nacl,Kcl, and Cscl is CO1- R

   (a) Licl > Nacl > Kcl >Cscl (b) Licl > Kcl > Cscl > Kcl

   (c) Cscl > Nacl > Kcl >Licl (d) Nacl > Kcl > Licl >Cscl

2. Linear geometry is seen with which of the following CO1- R

   (a) H_2S (b) H_2O (c) CH_4 (d) C_2H_2

3. Daniel cell is an example of CO2- R

   (a) primary cell (b) secondary cell

   (c) Constant cell (d) fuel cell

4. The best way to protect the spokes of a bicycle is CO2 -R

   (a) painting (b) electroplating

   (c) alloying (d) electro-less plating

5. All spontaneous process are accompanied by _____in entropy. CO3- R

   (a) Decrease (b) Increase (c) Same (d) No change

6. The condition for Spontaneous and reversible process is CO3- R

(a) $\Delta S < 0, \Delta G > 0$ (b) $\Delta S = 0, \Delta G > 0$ (c) $\Delta S > 0, \Delta G > 0$ (d) $\Delta S = 0, \Delta G < 0$

7. Producer gas is a mixture of CO4 -R

(a) Coal and O_2 (b) Petrol and H_2 (c) CO and N_2 (d) CO and H_2

8. The raw material used for synthesizing petrol in Fischer-Tropsch process is CO4- R

(a) kerosene (b) Diesel (c) coal (d) LPG

9. Brass alloy containing mainly CO5- R

(a) Cu and Zn (b) Cu and Sn (c) Zn and Pb (d) Cu and Fe

10. Which of the following is an example of ferrous alloy CO5- R

(a) alnico (b) bronze (c) brass (d) billon

PART – B (5 x 2= 10Marks)

11. what is meant by bond order? CO1- R

12. Suggest the most suitable methods for protecting the following metals from corrosion a) iron rod used in concrete b)bolt CO2 -R

13. Mention the limitations of phase rule. CO3 -R

14. What is a flue gas? CO4- R

15. What is Nichrome? Write the composition of Nichrome. CO5 -R

PART – C (5 x 16= 80Marks)

16. (a) With the help of M.O. theory, explain the paramagnetic character of oxygen and diamagnetic character of nitrogen. Calculate the bond order of N_2^-, CO, NO and O_2^+. CO1 -App (16)

Or

	(b)	(i) Explain the H-bonding and its consequences in Salicylic acid, ethanol, HF & acetic acid.	CO1 -App	(10)
		(ii) Show what do you understand by hybridization. Demonstrate the hybridized structure of methane molecule.	CO1- App	(6)
17.	(a)	(i) Derive the Nernst equation for electrode potential.	CO2 -U	(8)
		(ii) What are the main objective of electroplating. Give an account of the method used in electroplating of gold.	CO2 -U	(8)
		Or		
	(b)	(i) Calculate the EMF of a cell $Pt/Br_2(g)(0.1\ atm)/Br^-(0.5\ M)/Br_2(g)(1\ atm)/Pt$ at 298 K	CO2 -E	(6)
		(ii) Describe the electroplating process of gold.	CO2- U	(6)
		(iii) How can you protect the ship metal from corrosion?	CO2 -U	(4)
18.	(a)	(i) Write the final form of Maxwell's relations.	CO3 -Ana	(4)
		(ii) What is meant by eutectic point? Describe the reduced phase rule with one example.	CO3- Ana	(12)
		Or		
	(b)	Draw a neat phase diagram and explain the lead-silver system. Briefly write about Pattinson's process.	CO3 -Ana	(16)
19.	(a)	(i) Explain the proximate and ultimate analysis of coal.	CO4 -U	(8)
		(ii) Describe about catalytic cracking method of petrol.	CO4- U	(8)
		Or		
	(b)	(i) How can you analyze flue gas by Orsat apparatus?	CO4 -Ana	(12)
		(ii) Differentiate between NCV and GCV.	CO4 -Ana	(4)
20.	(a)	(i) What are composites? Explain the various constituents of it?	CO5 -U	(8)
		(ii) Explain the methods of fabrication of ceramic ware.	CO5- U	(8)
		Or		

(b)	(i)	Write short notes on a) Metal matrix composites and b) Ceramic matrix composites	CO5- U	(10)
	(ii)	Describe in detail about surface treatment methods.	CO5- U	(6)