LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

U.G. DEGREE EXAMINATION – **ALLIED**

THIRD SEMESTER – **NOVEMBER 2024**

UCH 3401 – APPLIED CHEMISTRY FOR PHYSICS

Date: 15-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

	SECTION A - K1 (CO1)	
	Answer ALL the Questions -	**(10 x 1 = 10)**
1.	**MCQ**	
a)	The _____ temperature is the temperature at which a material's conductivity reaches infinity. a) critical b) absolute c) mean d) crystallization	
b)	Thermogravimetry determines the ___change of a sample as a function of temperature or time. a) volume b) mass c) heat d) both a and c	
c)	A non-condensable gas is found _____. a) above the critical point b) below the critical point c) at the critical point d) all of the above	
d)	Which of the following methods is not used for the prevention of corrosion? a) Greasing b) Painting c) Plating d) Heating	
e)	Which amino acid is not optically active? a) Valine b) Isoleucine c) Glycine d) Leucine	
2.	**MCQ**	
a)	How many categories of nonlinear effects are in optical fibers? a) One b) Two c) Three d) Four	
b)	A differential thermogravimetry curve (DTG) is generated as the _____ derivative of the weight with respect to temperature or time. a) first b) second c) third d) none of the above	
c)	What is the name of the phase transition that occurs when a solid is converted directly into a gas? a) Melting b) Boiling c) Condensing d) Sublimation	
d)	The chemical formula of rust is _____. a) FeO b) Fe_2O_3 c) Fe_3O_4 d) $Fe(OH)_2$	
e)	Which of the following is the simplest carbohydrate? a) Glucose b) Glyceraldehyde c) Benzaldehyde d) Sucrose	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**True or False**	
a)	Superconductivity is a macroscopic quantum phenomenon.	
b)	TGA, DTA, and DSC are measured using the same modern thermal analysis instrument.	
c)	The triple point of water is 0.0098 oC at pressure 4.58 mm of Hg.	
d)	Metal corrosion can be accelerated by the presence of oxygen in the atmosphere.	
e)	Maltose is a non-reducing disaccharide.	

4.	**Answer the following**
a)	Which type of electron pair exists in a superconductor?
b)	How are endotherms and exotherms plotted in DTA analysis?
c)	Write Gibbs phase rule for a general system.
d)	How does temperature affect corrosion?
e)	Give an example of polysaccharide.
	SECTION B - K3 (CO2)
Answer any TWO of the following	**(2 x 10 = 20)**
5.	a) Explain Meissner effect in superconductors. How does it work? (5) b) Discuss the applications of liquid crystals. (5)
6.	Draw and interpret the thermogram of calcium oxalate monohydrate and silver nitrate. (5+5)
7.	Sketch and explain the phase diagram of lead-silver system.
8.	a) Differentiate between chemical and electrochemical corrosions. (5) b) Illustrate microbiologically influenced corrosion. (5)
	SECTION C – K4 (CO3)
Answer any TWO of the following	**(2 x 10 = 20)**
9.	Differentiate between Type-I and Type-II superconductors.
10.	Explain the principle and instrumentation of thermogravimetric analysis.
11.	Sketch and explain the phase diagram of sulphur system.
12.	Explain the following terms. (4 x 2.5) i) Isoelectric point ii) Iodine value iii) Essential fatty acids iv) Molish's test
	SECTION D – K5 (CO4)
Answer any ONE of the following	**(1 x 20 = 20)**
13.	a) Explain the instrumentation of DTA. (10) b) Sketch and explain the phase diagram of water system. (10)
14.	a) Discuss the cathodic and anodic protections in corrosion. (10) b) List any two the importance of the following carbohydrates with structure. (4 x 2.5) i) Sucrose ii) Lactose iii) Glucose iv) Fructose
	SECTION E – K6 (CO5)
Answer any ONE of the following	**(1 x 20 = 20)**
15.	a) Illustrate the characteristics of cholesteric and columnar liquid crystals. (10) b) Compare and contrast TGA and DTA. (5) c) Derive the phase rule for a heterogeneous system. (5)
16.	a) Describe the following. (5+5)

	i) Corrosion inhibitors ii) Organic coatings. b) Illustrate the special case side chain amino acids with structure.	(10)
