

# University of Mumbai

Program: **BE**

Curriculum Scheme: Rev2019

Examination: FE Semester I

Course Code: 103 and Course Name: Engineering Chemistry 1

Time: 2 hour

Max. Marks: 60

<b>Q1.</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
1.	Small molecules which combine to form polymer are called _____
Option A:	Resins
Option B:	Monomers
Option C:	Plastic
Option D:	Blocks
2.	Identify the correct statement which is related to aromatic hydrocarbon?
Option A:	It has only sigma bonds
Option B:	It has only pi bonds
Option C:	It has a sigma and two pi bonds
Option D:	It has a sigma and delocalized pi bond
3.	What is the bond order of Oxygen molecule (O <sub>2</sub> )
Option A:	1
Option B:	2
Option C:	2.5
Option D:	3
4.	Hardness of water is due to the presence of salts of _____
Option A:	Potassium
Option B:	Chlorine
Option C:	Boron
Option D:	Magnesium
5.	An alloy of tin and lead contain 73% tin. Find the mass of eutectic in 1 kg of solid alloy if the eutectic contains 64% of tin
Option A:	750 g
Option B:	480 g
Option C:	650 g
Option D:	680 g
6.	Tributyl phosphate is used in plastic as _____
Option A:	Stabilizer
Option B:	Binder
Option C:	Catalyst
Option D:	Plasticizer

7.	Calculate the temporary hardness of a sample of water containing $\text{Mg}(\text{HCO}_3)_2 = 7.3\text{mg/l}$ , $\text{Ca}(\text{HCO}_3)_2 = 16.2\text{mg/l}$ .			
Option A:	20ppm			
Option B:	25ppm			
Option C:	15ppm			
Option D:	10ppm			
8.	Calculate the number average molecular weight of the polymer			
	Number of polymers, N1	Molecular weight of each Polymer, M1		
	1	100		
	2	200		
	3	400		
	2	500		
	1	600		
Option A:	366.67			
Option B:	36.67			
Option C:	3.667			
Option D:	0.3666			
9.	Calculate the degree of freedom for the following reaction. $\text{CH}_4 \rightarrow \text{CO}_2 (\text{gas}) + 2\text{H}_2\text{O}$			
Option A:	2			
Option B:	3			
Option C:	4			
Option D:	6			
10.	Which of the following molecules have bond order equal to 1?			
Option A:	NO, HF, HCl, $\text{Li}_2$ , CO			
Option B:	$\text{H}_2$ , $\text{Li}_2$ , $\text{B}_2$ , HF, HCl			
Option C:	$\text{Li}_2$ , $\text{B}_2$ , CO, NO, $\text{He}_2^+$			
Option D:	$\text{B}_2$ , CO, $\text{He}_2^+$ , NO, HF			
11.	Which of the following ion get released from the cation exchange column?			
Option A:	$\text{H}^+$			
Option B:	$\text{Na}^+$			
Option C:	$\text{K}^+$			
Option D:	$\text{Ca}^{+2}$			
12.	Which artificial polyamide is used in the manufacture of crash helmets and bullet proof vests			
Option A:	Nylon			
Option B:	PVC			
Option C:	Polystyrene			
Option D:	Kevlar			

13.	What is the formula for the Degree of Freedom for a condensed phase rule?
Option A:	$F=C-P+2$
Option B:	$F=C-P+1$
Option C:	$F=C+P+2$
Option D:	$F=C+P+1$
14.	Cycloheptatriene has three conjugated double bonds, so its Huckel number is _____.
Option A:	one
Option B:	three
Option C:	four
Option D:	six
15.	25ml of sewage water is refluxed with 0.1N $K_2Cr_2O_7$ solution in presence of $H_2SO_4$ and $Ag_2SO_4$ . The unreacted dichromate required 5.5ml of 0.1N FAS solution. Back titration consumed 15ml of 0.1N FAS solution. Calculate the COD of the effluent in mg/l.
Option A:	25 ppm
Option B:	304 ppm
Option C:	100 ppm
Option D:	250 ppm

### Option 1

<b>Q2</b> (15 Marks)	<b>Solve any THREE out of FIVE</b>	<b>5 marks each</b>
A	Give the Kekule structure for benzene. Discuss the problem with the structure. (any two)	
B	Draw and explain phase diagram of Pb-Ag system .	
C	What are the characteristics of aromatic compounds?	
D	Define BOD and COD. Give its significance.	
E	a) Write a brief note on Reverse Osmosis. b) Discuss the effect of temperature on polymers .	

<b>Q3.</b> (15 Marks)	<b>Solve any THREE out of FIVE</b>	<b>5 marks each</b>
A	What is meant by fabrication of Plastic ? Explain Compression moulding with the help of neat diagram.	
B	1. Give the Molecular Orbital diagram of nitric oxide(NO) molecule. 2. What are atomic orbitals? Explain the s-orbitals	
C	Write preparation, properties and uses of following polymer: (i) PMMA (ii) Kevlar	
D	Describe the Demineralisation process. State its advantages and disadvantages.	

E	1gm of <b>CaCO<sub>3</sub></b> was dissolved in 1 litre of distilled water. 50ml of solution required 45ml EDTA for titration. 50ml of hard water required 25ml of EDTA for titration. The water sample after boiling and filtering consumed 15ml of EDTA for titration. Calculate the total and permanent hardness of the sample.
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