

**University of Mumbai**  
**Examination 2020 under cluster \_3\_ (Lead College: FCRIT)**

Program: First Year Engineering (All Branches)

Curriculum Scheme: Rev 2019 C Scheme

Examination: FE Semester I

Course Code: FEC103 and Course Name: Engineering Chemistry I

Time: 1 ½ hours

Max. Marks 60

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2604\_R19\_FE\_I\_FEC103\_QP

N.B. 1. Attempt all questions

2. Atomic Weights: H=1, C=12, N=14, O=16, Na = 23, Ca = 40, Mg=24, Cl=35.5, S =32, K=39, Si =28

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry two marks.
1.	Which of the following is the eutectic composition of Ag-Pb system?
Option A:	2.6% Pb + 97.4% Ag
Option B:	26% Pb + 74 %Ag
Option C:	74 %Pb + 26% Ag
Option D:	97.4% Pb + 2.6% Ag
2.	Which of the following is the magnetic property of NO molecule?
Option A:	Ferromagnetic
Option B:	Paramagnetic
Option C:	Diamagnetic
Option D:	Antiferromagnetic
3.	Which of the following dissolved salt does not contribute to any kind of hardness to the water?
Option A:	KCl
Option B:	Mg(HCO <sub>3</sub> ) <sub>2</sub>
Option C:	CaCl <sub>2</sub>
Option D:	Mg(NO <sub>3</sub> ) <sub>2</sub>
4.	The chemical reaction between which of the following can give Kevlar Polymer?
Option A:	Hexamethylenediamine + adipic acid
Option B:	Ethylene glycol + Adipic acid
Option C:	Terephthalic acid + Ethylene glycol
Option D:	1,4 phenylenediamine + terephthaloyl chloride
5.	‘No two electrons in an atom can have same four sets of quantum number’ is best known as
Option A:	Aufbau Principle
Option B:	Hund’s rule

Option C:	Pauli exclusion principle
Option D:	Mullikan's principle
6.	Extrusion molding cannot be used for manufacture of which of the following?
Option A:	Insulated electric cables
Option B:	Buckets
Option C:	Pipes
Option D:	Tubes
7.	Which of the following is not aromatic?
Option A:	Naphthalene
Option B:	Pyrrole
Option C:	Benzene
Option D:	Cyclobutadiene
8.	Which of the following is not a thermoplast?
Option A:	Polyethylene
Option B:	Polyvinyl chloride
Option C:	Bakelite
Option D:	PMMA
9.	In Reverse Osmosis the flow of solvent is through semi permeable membrane from-
Option A:	Higher concentration to lower concentration solution
Option B:	Lower concentration to higher concentration solution
Option C:	Equal concentration of solutions.
Option D:	Independent of concentration
10.	Which of the following is the bond order for CO molecule?
Option A:	1
Option B:	2
Option C:	3
Option D:	4
11.	Which of the following is the hybridization of Nitrogen in Pyrrole molecule?
Option A:	sp
Option B:	sp <sup>2</sup>
Option C:	sp <sup>3</sup>
Option D:	sp <sup>2</sup> d
12.	Which of the following is/are the number of component/s for $\text{CaCO}_3(\text{s}) = \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$ ?
Option A:	1
Option B:	2
Option C:	3
Option D:	4
13.	Cation exchanger bed was exhausted after passing 50,000 L of hard water. 200L of 1N HCl was needed for its regeneration. Hardness of the water is closer to which of the following?

Option A:	1000 ppm
Option B:	400 ppm
Option C:	200 ppm
Option D:	100 ppm
14.	Which of the following is an example of conducting polymer?
Option A:	Polyaniline
Option B:	Polyvinyl chloride
Option C:	PMMA
Option D:	Polyethene
15.	Which of the following represents Gibb's reduced phase rule equation?
Option A:	$P+F = C+ 2$
Option B:	$P+F = C-1$
Option C:	$P+F = C-2$
Option D:	$P+F = C+ 1$

<b>Q.2]</b>	<b>Attempt <u>any three</u> from the following.</b>	<b>[5Marks each]</b>
(a)	Draw a neat diagram and explain the ion exchange process of demineralization of hard water.	
(b)	Draw a neat diagram and explain transfer moulding of plastic.	
(c)	Draw and explain phase diagram of the one component water system.	
(d)	Draw and explain the molecular orbital diagram for O <sub>2</sub> molecule. Also calculate its bond order and predict its magnetic property.	
(e)	Hard water sample contains following impurities (in mg/L) Ca (HCO <sub>3</sub> ) <sub>2</sub> = 174    MgSO <sub>4</sub> = 146    Mg(HCO <sub>3</sub> ) <sub>2</sub> = 168 Ca(NO <sub>3</sub> ) <sub>2</sub> = 198    CaCl <sub>2</sub> = 165    SiO <sub>2</sub> = 123    NaNO <sub>3</sub> = 137 Calculate Temporary, Permanent and Total Hardness of the given sample of the water.	

<b>Q.3]</b>	<b>Attempt <u>any three</u> from the following</b>	<b>[5Marks each]</b>
(a)	Explain bonding in Benzene molecule.	
(b)	What is the role played by Plasticizer, Filler and Catalyst in compounding of the plastic?	
(c)	Write a brief note on Electrodialysis process of purification of water.	
(d)	What are the advantages and limitations of the Phase Rule?	
(e)	Sample of polymer consist of total ten molecules. There exist five molecules each having molecular weight of 20,000 units, Three molecules, each having molecular weight of 25,000 units and two molecules, each having molecular weight of 30,000 units. Calculate number and weight average molecular weight of the polymer.	

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2604\_R19\_FE\_I\_FEC103\_AK

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	B
Q3.	A
Q4	D
Q5	C
Q6	B
Q7	D
Q8.	C
Q9.	A
Q10.	C
Q11.	B
Q12.	B
Q13.	C
Q14.	A
Q15.	D