University of Mumbai
Examination 2020 under cluster 3 FCRIT

Program: **FE**
Curriculum Scheme: Rev2019
Examination: FE Semester I
Course Code: FE 103 and Course Name: Engineering Chemistry-1
Time:1.5 hours Max. Marks: 60

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
Additional Data: Atomic Weights **[Ca= 40, Mg = 24, Na = 58.5, K =39, Cl =35.5, C= 12, N= 14, O =16, H =1]**	
1.	Which of the following impurities is responsible for alkaline hardness?
Option A:	$CaCO_3$
Option B:	$CaSO_4$
Option C:	$Ca(HCO3)_2$
Option D:	$CaCl_2$
2.	Calculate F , for the system , $NH_4Cl(g)$ -----> $xNH_3(g)$ + $yHCl$ (g), when, $x \neq y$
Option A:	2
Option B:	3
Option C:	0
Option D:	1
3.	Select an odd man out:-
Option A:	Addition polymers
Option B:	PMMA
Option C:	Thermoplastic polymers
Option D:	Thermosetting polymer
4.	Which of the following gases can be liquefied easily?
Option A:	Ammonia
Option B:	Water vapours
Option C:	Hydrogen
Option D:	Carbon dioxide
5.	Benzene has --------- hydrogen atoms less than the corresponding alkane.
Option A:	8
Option B:	6
Option C:	4
Option D:	1

6.	A molecule will behave as a good monomer, if,
Option A:	It has a functionality zero
Option B:	It should have unsaturated character only
Option C:	It should not have unsaturated character bust must possess polar functional groups
Option D:	It should be at least bi-functional with either unsaturated character or with polar functional groups.
7.	How many grams of $MgSO_4$ are dissolved in water to give hardness of 175 ppm ?
Option A:	210 gm
Option B:	0.175 gm
Option C:	0.210 gm
Option D:	175 gm
8.	Addition of plasticizers to polymer chains leads to _____ in their glass transition temperature.
Option A:	decrease
Option B:	increase
Option C:	neither increase nor decrease
Option D:	sharp melting
9.	Select the correct statement from the following:-
Option A:	If, no of bonding orbitals < no.of antibonding orbitals, then molecule is stable.
Option B:	If, no of bonding orbitals = no.of antibonding orbitals, then molecule is stable.
Option C:	If, no of bonding orbitals > no.of antibonding orbitals, then molecule is stable.
Option D:	Bond length is directly proportional to bond order.
10.	What do you mean by invariant system?
Option A:	Minimum 1 condition to be specified to define the system completely.
Option B:	No condition is required to be specified to define the system completely.
Option C:	No. Of degrees of freedom = 1.
Option D:	It is also known as univariant system.
11.	The shape of an atomic orbital is determined by,
Option A:	Principal quantum number (n)
Option B:	Orbital quantum number (l)
Option C:	Magnetic quantum number (m)
Option D:	Magnetic and Orbital quantum numbers (l) and (m)
12.	Which one of the following is one component system?
Option A:	$Ag_{(s)} \rightleftharpoons$ Ag-Pb solution $_{(l)} + Pb\text{-}Ag_{(g)}$
Option B:	H_2O (l) $\rightleftharpoons$ 1/2 $H_{2(g)} + O_{2(g)}$
Option C:	$CaCO_3(s) \rightleftharpoons CaO_{(s)} + CO_2$ (g)
Option D:	H_2O (s) $\rightleftharpoons$ $H_2(g) + H_2O$ (g)
13.	150 ml sewage containing 750 ppm dissolved oxygen is diluted to 300 ml in a BOD bottle. After 5 days dissolved oxygen content is 220 ppm.Calculate BOD of sewage.
Option A:	1060 ppm

Option B:	265 ppm
Option C:	530 ppm
Option D:	Insufficient data.
14.	Why is pyrrole weakly basic?
Option A:	Lone pair of electrons is involved in delocalisation
Option B:	does not have any lone pair of electrons
Option C:	There is no delocalization of electrons in pyrrole
Option D:	Since it is a benzenoid compound
15.	Which of the following statements is true for the state of a substances at critical temperature?
Option A:	The densities of liquid and that of vapour become equal.
Option B:	The boundary between liquid and gaseous phase disappear
Option C:	The liquid phase disappears and everything appears as vapour phase
Option D:	The liquid and gaseous state become indistinguishable.

Q2	**Solve any Three Questions out of Five** **5marks each**
A	Give principle of EDTA method. 50ml of standard hard water containing 1mg of pure $CaCO_3$ per ml, consumed 13ml of EDTA. 50ml of a water sample consumed 22ml of EDTA using EBT indicator. Calculate the hardness of the water sample in ppm.
B	With the help of a phase diagram, derive the degrees of freedom for one component system and explain the concept of triple point.
C	With the help of electronic configuration, draw the M.O diagram of CO molecule and explain its bond order and magnetic property.
D	Explain the transfer moulding technique with the help of following points:- Type of polymer used ,Neat and labeled diagram and advantages.
E	Derive the equation of state for a real gas.

Q3	**Solve any Three Questions out of Five** **5marks each**
A	Explain the structure and bonding in benzene.
B	State condensed phase rule.What metal will separate out when a liquid alloy of Copper and Aluminium containing 35% Copper is cooled, if the eutectic contains 38% Copper. How many grams of that metal can be separated from 200 gm of the alloy.

C	In a polymer sample, 25% molecules have molecular weight 10000 , 30% have molecular weight 30,000 , 20% molecules have molecular weight 20,000 and remaining have molecular weight 50,000. Calculate the Polydispersity index.
D	With the help of neat and labeled diagram and reactions describe the process of ion exchange method .
E	Explain LCAO method with reference to Molecular orbital theory.

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