

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086  
(For candidates admitted during the academic year 2015-16 & thereafter)

SUBJECT CODE: 15CH/AC/FC43

B.Sc. DEGREE EXAMINATION, APRIL 2018  
BRANCH III - PHYSICS  
FOURTH SEMESTER

COURSE : ALLIED – CORE  
PAPER : FUNDAMENTALS OF CHEMISTRY- II  
TIME : 3 HOURS MAX. MARKS : 100

SECTION – A

Answer all the questions:

(30 x 1 = 30)

I. Choose the correct answer:

1.  $A + B \longrightarrow$  product. If  $\frac{dx}{dt} = k$ , then order is
  - a) 4
  - b) 2
  - c) 1
  - d) Zero
2. Resistivity of a material is equal to resistance when
  - a) Cell constant =  $1 \text{ cm}^{-1}$
  - b) Cell constant =  $0.1 \text{ cm}^{-1}$
  - c) Cell constant =  $10 \text{ cm}^{-1}$
  - d) Cell constant =  $100 \text{ cm}^{-1}$
3. When a dilute aqueous  $\text{Li}_2\text{SO}_4$  solution is electrolysed, the products formed at the anode and cathode respectively, are
  - a)  $\text{SO}_2$  and Li
  - b)  $\text{SO}_2$  and  $\text{H}_2$
  - c)  $\text{O}_2$  and Li
  - d)  $\text{O}_2$  and  $\text{H}_2$
4. In a single component condensed system, if degree of freedom is zero, maximum number of phase that can co-exist is -----
  - a) 2
  - b) 3
  - c) 0
  - d) 1
5. In water system the number of phases is -----
  - a) Three
  - b) Two
  - c) Zero
  - d) one

6. In the phase diagram -----point corresponds to the lowest melting point of a mixture of components
  - a) Eutectic point
  - b) Triple point
  - c) Critical point
  - d) Multiple point
7. According to Beer Lambert Law,
  - a)  $A = \epsilon bc$
  - b)  $A = \epsilon b^2 c$
  - c)  $A = \epsilon / bc$
  - d)  $A = -\epsilon bc$
8. The rate of combination of  $\text{SO}_2$  and  $\text{O}_2$  is slowed down considerably if some arsenic compounds are present even in tracers. Arsenic here is considered as
  - a) Catalytic promoters
  - b) Catalytic poison
  - c) Catalytic initiator
  - d) Catalytic terminator
9. The standard electrode potential for  $\text{Pb}^{2+} / \text{Pb}$  and  $\text{Zn}^{2+} / \text{Zn}$  are  $-0.126\text{V}$  and  $-0.763\text{V}$  respectively. The emf of the cell  $\text{Zn} / \text{Zn}^{2+} (0.1\text{M}) // \text{Pb}^{2+} (0.1\text{M}) / \text{Pb}$  is
  - a)  $-0.637\text{ V}$
  - b)  $-0.157\text{ V}$
  - c)  $+0.637\text{ V}$
  - d)  $0.297\text{ V}$
10. If a plot of  $\log_{10}C$  versus  $t$  gives a straight line for a given reaction, then the reaction is
  - a) Zero order
  - b) First order
  - c) Second order
  - d) Third order

## II Fill in the blanks:

11. Reduced phase rule equation is -----
12. The rate of decrease of intensity of radiation is proportional to its .....
13. Hydrolysis of ester is an example of -----order reaction
14. In Arrhenius equation  $k = Ae^{-E_a/RT}$  where A is called .....
15. .... is used as a depolarizer in Leclanche cell
16. Pattinsons process is desilverisation of -----
17. Inversion of cane sugar is an example of .....catalysis reaction
18. The quantity  $2S + 1$ , where S is the total electron spin is known as the .....of a state
19. .... is an electrochemical cell that produces electricity as a result of spontaneous redox reaction occurring inside.

20. Hydrogenation of carbon carbon double bond in ethylene in the presence of nickel catalyst is an example of .....catalysis

**III State whether True or False:**

21. The unit of zero order rate constant is  $\text{time}^{-1}$   
22. At triple point the degree of freedom is zero.  
23. The emission of radiation because of the transition from a triplet state to a singlet state is called fluorescence.  
24. The energy associated with an Avagadro number of quanta is called Einstein.  
25. Higher the value of standard reduction potential greater is the tendency to undergo reduction.

**IV Answer in a line or two:**

26. What is the unit of rate of the reaction?  
27. What is a salt bridge?  
28. What is triple point?  
29. What is chemiluminescence?  
30. What is the basic observation made in the laboratory to study enzyme catalysis?

**SECTION - B**

**Answer any five questions:**

**(5 x 6 = 30)**

31. Discuss the integrated rate equation method and half life method of determination of order of reaction  
32. What is electrochemical series? Discuss its applications.  
33. Write Nernst equation and give its significance  
34. Explain photosensitization with an example?  
35. Give the characteristics of enzyme catalysed reactions.  
36. What is Arrhenius equation? Explain the term activation energy  
37. What are secondary cell? Explain the function of Lead storage battery.

**SECTION - C**

**Answer any two questions:**

**(2 x 20 = 40)**

38. a. Draw and explain the phase diagram of simple eutectic lead-silver system.  
b. Explain the phase diagram of Sulphur system.  
39. a. Discuss the kinetics of Hydrogen chlorine reactions  
b. Write short notes on fluorescence and phosphorescence.  
40. a. Derive the integrated rate equation for a first order reaction and give its expression for half life.  
b. Explain Homogenous and Heterogeneous catalysis with examples.

