Reg. No. : ....

Name : ....
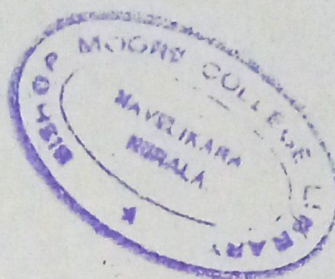
Third Semester B.Sc. Degree Examination, March 2022

First Degree Programme under CBCSS

Chemistry

Complementary Course for Physics

CH 1331.1 : PHYSICAL CHEMISTRY II

(2017 and 2018 Admission)

Max. Marks : 80

Time : 3 Hours

SECTION – A

Answer **all** questions, **each** carries **1** mark.

1. What is meant by average velocity?

2. What is the unit of k in zero order reaction?

3. Find out the number of Bravais lattice pertaining to cubic lattice.

4. What is the distance between adjacent (111) planes of a cubic lattice?

5. If the standard reduction potentials of Zn/Zn^{2+} and Ag/Ag^+ are –0.76 V and +0.80 V respectively, for the cell obtained by coupling these electrodes, calculate the standard EMF of the cell.

6. A reaction $A + B \rightarrow C$ has zero order. Write its rate equation.

7. Which gas has lowest critical temperature?

8. Represent a galvanic cell.

9. Explain quantum yield.

10. What is the point group NH_3 molecule?

<div align="right">(10 × 1 = 10 Marks)</div>

SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks.

11. Calculate the average velocity for N_2 molecule at 273 K?

12. What is liquid junction potential and how it can be eliminated?

13. Distinguish between amorphous and crystalline solids.

14. Draw (111) and (110) planes in a primitive cubic lattice.

15. Define single electrode potential.

16. Sketch the unit cell of NaCl.

17. Write down the Nernst equation for the EMF of a cell.

18. Explain alternate axis of symmetry with example.

19. Derive first order integrated rate expression.

20. Why phosphorescence are called delayed fluorescence?

21. Explain intermediate compound formation theory in catalysis.

22. Explain the role of salt bridge in Galvanic cell.

<div align="right">(8 × 2 = 16 Marks)</div>

SECTION – C

Answer any **six** questions. **Each** question carries **4** marks.

23. How is pH of a solution determined using hydrogen electrode?

24. Explain Joule-Thomson effect.

<div align="center">2</div>

25. Derive the rate expression for the H_2-Cl_2 photochemical reaction.

26. Explain how Avogadro number can be calculated from crystal density measurements and diffraction data?

27. What are the significances of Bragg's equation?

28. What are fuel cells? Explain the cooking of H_2-O_2 fuel cells.

29. Write a brief note on photosensitization in photochemistry.

30. One microgram of ^{24}Na was injected into the blood of a patient. How long will it take for radioactivity to fall to 10% of the initial value? The half life of ^{24}Na is 14.8 hours.

31. What are the symmetry elements present in BF_3 molecule? Deduce its point group.

$$(6 \times 4 = 24 \text{ Marks})$$

SECTION – D

Answer any two questions. Each question carries 15 marks.

32. (a) Define critical constants. Derive the relation expressing the critical constant of a gas in terms of van der Waals equation. **10**

    (b) Using van der Waal's equation, calculate pressure exerted by one mole of a gas enclosed in a 1.5 dm^3 flask at 400 K a = 3.0 $atmdm^6mol^{-2}$ b = 0.05 $dm^3 mol^{-1}$. **5**

33. Write an essay on conductometric titrations.

34. (a) Derive integrated Arrhenius equation. **7**

    (b) Discuss the X-ray studies of crystal by powder method. **8**

35. Discuss the mechanism and kinetics of enzyme catalysis.

$$(2 \times 15 = 30 \text{ Marks})$$

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