

Reg. No.....

Name.....

**B. Sc. DEGREE END SEMESTER EXAMINATION MARCH 2017**  
**SEMESTER - 4: COMPLEMENTARY COURSE FOR BSC PHYSICS**  
**COURSE: 15U4CPCHE4.1 - ADVANCED PHYSICAL CHEMISTRY II**

*(Regular 2015 Admission)*

Time: Three Hours

Max. Marks: 60

**Section A***(Answer all questions, each question carries 1 mark)*

1. Determine the oxidation number of Cr in  $K_2Cr_2O_7$ .
2. What is the unit of  $k$  for a second order reaction?
3. Define oxidation by electronic concept.
4. Give an example of a catalyzed reaction.
5. Give the mathematical expression for quantum yield.
6. What are weak electrolytes? Give an example.
7. What is a reversible cell?
8. Arrange the following radiations in decreasing order of frequency: IR, Radio waves and visible.

 $(1 \times 8 = 8)$ **Section B***(Answer any six questions, each question carries 2 marks)*

9. What is red shift and blue shift?
10. How many vibrational modes of freedom does carbon dioxide molecule have? What are the vibrations?
11. Differentiate between order and molecularity of a reaction. (Any 2 differences)
12. State any two rules for determining oxidation number.
13. The force constant of HCl is  $480 \text{ Nm}^{-1}$ . Calculate the fundamental stretching frequency of the absorbed radiation in wave number. (Mass of H -  $1.67 \times 10^{-27} \text{ kg}$ . Mass of Cl -  $58.86 \times 10^{-27} \text{ kg}$ )
14. What is liquid junction potential? How can you eliminate it?
15. Give example of a compound in which hydrogen shows (a) +1 oxidation state (b) -1 oxidation state.
16. What is meant by secondary processes in a photochemical reaction.

**Section C**

(Answer **any four** questions, each question carries **5 marks**)

- 17.** Sketch the rotational levels for a rigid diatomic molecule and also represent the rotational spectrum schematically.
- 18.** A first order reaction is 20% complete in 15 minutes at 27°C and in 3 minutes at 47°C. Calculate the energy of activation for the reaction. (R = 8.314J/K/mol)
- 19.** Describe a Daniel Cell. What is the electrical energy supplied by the cell if the emf of the cell is 1.1 volt.
- 20.** How will you determine the pH of a solution using glass electrode?
- 21.** What is meant by cell constant? How is it determined?
- 22.** What are redox reactions? Illustrate them using two reactions.

(5 × 4 = 20)

**Section D**

(Answer **any two** questions, each question carries **10 marks**)

- 23.** How will you determine the dissociation of a weak monobasic acid using (a) emf and (b) conductance measurements?
- 24.** Discuss the salient features of electronic spectroscopy. What are the different types of electronic transitions that can occur in molecules?
- 25.** a) What are photosensitized reactions? Give two examples.  
b) Explain phosphorescence and fluorescence?
- 26.** Give an account on  
a) Kohlrausch's law of independent migration of ions  
b) Hydrogen-Oxygen Fuel cell

(10 × 2 = 20)

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