Total No. of Printed Pages:2

SUBJECT CODE NO:- B-2003
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. T.Y. (Sem-V) Examination Oct/Nov 2019
Chemistry Paper – XIII
Physical Chemistry

[Time: 1:30 Hours]   [Max. Marks: 50]

Please check whether you have got the right question paper.
N.B   1) Attempt all questions.
             2) Figures to the right side indicate full marks.

Q.1   a) State and explain types of quantum numbers.   10

         b) Derive an equation for moment of inertia for diatomic molecule.   10
            Distance between two successive lines in spectra of HI molecule was 20.5 cm^{-1}. Calculate
            moment of inertia and bond length if reduced mass is $1.5 \times 10^{-26} Kg$.
            ($h = 6.626 \times 10^{-34} JS, c = 3 \times 10^8 ms^{-1}$)

                                                OR

         c) Explain photoelectric effect?   10
            Calculate de-Broglie's wavelength of moving particle with velocity $2.42 \times 10^{-8} cm^{-1}$.
            (mass of particle $m = 9.1 \times 10^{-28} g, h = 6.626 \times 10^{-27}$ erg sec)

         d) Describe basic features of different spectrometer.   10

Q.2   a) Give difference between thermal and photochemical process.   10
            When substance was exposed to light for 30 minutes, 0.002 moles of it reacted. Calculate
            quantum yield if substance absorbs 2.2×10^{17} photons per sec.

         b) What is dipole moment? How is it determined by temperature change method?   10
                                                OR

            Write short notes on any four of the following.   20
            a) Plank's radiation law.
            b) Born-Oppenheimer approximation.
            c) Photosensitized reaction.
            d) Optical activity.
            e) Synthesis of nanomaterial by micro organism.
            f) Physical vapour deposition method

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Q.3   Multiple choice questions.   10

1) The radiation given by black body depends on _____ of the cavity
   a) Pressure   b) Temperature
   c) Mass   d) Volume

2) Bohr's theory has no explanation for
   a) Zeeman effect   b) Stark effect
   c) Both a & b   d) None of these

3) For visible radiation most commonly used radiation source is
   a) Tungsten filament lamp   b) Hydrogen lamp
   c) Deuterium lamp   d) All of these

4) The rotational spectrum is shown by the molecules _____
   a) HF   b) HCI
   c) CO   d) All of these

5) If one molecule decomposes per photon, the quantum yield is
   a) 3   b) 2
   c) 1   d) 0

6) Photochemical decomposition of a substance is called
   a) Photolysis   b) Chemolysis
   c) Both   d) None of these

7) Which of the following is a polar molecule?
   a) HF   b) HCI
   c) HBr   d) All of these

8) Instrument used to measure the angle of rotation of an optically active compound is
   a) Polarimeter   b) Spectrometer
   c) Colorimeter   d) None of these

9) The word nano mans
   a) Four billionth   b) Three billionth
   c) Two billionth   d) One billionth

10) Leaves of germanium plant are used for the synthesis of nanomaterials ------
   a) Ag   b) Au
   c) CdS   d) ZnS