Total No. of Printed Pages:02

SUBJECT CODE NO:- B-2003
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. T.Y. (Sem-V)
Examination November/December-2022
Chemistry Paper – XIII
(Physical Chemistry)

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

Please check whether you have got the right question paper.

N.B i) Attempt all questions.
ii) Figures to the right indicate full marks.

Q.1 a) Derive Schrodinger's wave equation and give its importance. 10

b) Describe basic features of different spectrometers. Calculate the bond length of NaCl molecule if its moment of inertia is 12.90×10^{-39} gm-cm^2. 10
(Atomic masses of Na is 23 g-mole^{-1} and Cl is 35.5 g-mole^{-1} N=6.023×10^{23})

OR

c) Draw Jablonski diagram and explain non radiative transitions. 10
Calculate quantum field when 0.05 moles of substance was exposed to light for 20 minutes by absorption of 2.5×10^7 photons per second.

d) What is optical activity? How it is measured by polarimeter. 10

Q.2 a) What is electromagnetic radiation? Explain different regions of electromagnetic radiation. 10

b) State and explain de Broglie's hypothesis. 10
Calculate the de Broglie's wave length of an object of mass 100 gms moving with velocity 500 m/s. h = 6.626×10^{-27} erg.sec.

OR

Write a short note on any tour of the following. 20
a) Compton effect
b) Born open heimer approximation
c) Quantum field
d) Magnetic properties
e) Chemical vapour deposition
f) synthesis of nanomaterial by using micro emulsion method

Q.3 Select and write the correct answer of the following. 10

1) In photoelectric effect the number of photoelectrons emitted depends upon…
a) Wavelength b) Frequency c) Intensity d) Amplitude

2) From the Heisenberg's uncertainty principle the uncertainty in velocity can be expressed as_____

a) $\Delta U = \frac{h}{4\pi} m\, \Delta x$ b) $\Delta U = h/3\pi\, m\, \Delta x$

c) $\Delta U = h/\pi m \Delta$ d) None of these

3) In spectroscopy the energy is expressed in _____

a) calories b) Joules c) ergs d) per centimeter

4) the distance between two successive lines of rotational spectra is _____

a) B b) 2B c) 3B d) 4B

5) The quantitate approach to photochemical laws is given by _____

a) Lambert Beer's law b) Grothus D rapper law

c) Stark Einstein law d) None of above

6) Fluorescence occurs when transition is _____

a) singlet to singlet b) singlet to triplet

c) Triplet to singlet d) Triplet to triplet

7) The dipole moment of methane is _____

a) 4 b) 3 c) 2 d) 0

8) If the magnetic permeability is less than one, the substance is _____

a) Diamagnetic b) Paramagnetic

c) Ferromagnetic d) None of above

9) Synthetic diamonds are prepared by _____

a) PUC b) CUP c) HEBM d) Plant extract

10) 1A° is equal to _____

a) 1nm b) 10nm c) 100nm d) 0.1 nm