West Bengal State University
B.A./B.Sc./B.Com. (Honours, Major, General) Examinations, 2012
Part – II

CHEMISTRY — HONOURS
Paper - IV A

Duration : 2 Hours | Maximum Marks : 5

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Answer any *three* questions taking *one* question from each Unit.

UNIT – I

1. a) Determine whether the following functions are acceptable or not as a stat function over the indicated intervals :

i) $\psi = \sin^{1} x\,(-1,1)$ ii) $\psi = e^{-x}\,(0,\infty)$ iii) $\psi = e^{-x^2}\,(-\infty,\infty)$

b) Find the average distance | $< r >$ | of the electron from the nucleus of 1*s* state a H-atom. | Given, $\psi_{1s} = \left(\frac{1}{\pi a_o^3}\right)^{1}{}^{2} e^{-\frac{r}{a_o}}$ |

c) Calculate the de Broglie wavelength for an electron ($m_e = 9{\cdot}1\times10^{-31}$ kg) havi kinetic energy as 13·6 eV. (Given electronic charge = $1{\cdot}6\times10^{-19}$ coulomb).

d) Find the value of the commutator $\left[\hat{x}, \hat{p}_x\right]$.

e) What is photoelectric effect ? Draw a plot of kinetic energy for the ejec photoelectrons versus frequency of the incident radiation in a photoelec experiment with three different metals. What inference regarding phys quantities may be drawn from the plot ?

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