SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
M.Sc. - END SEMESTER EXAMINATIONS APRIL - 2022
SEMESTER - II
20PCHCT2006 - Physical Chemistry -II

Total Duration : 3 Hrs. **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Describe the expression for entropy production in an irreversible process.
2. Discuss the principle involved in the study of fast reactions by Flash photolysis
3. Write a notes on i) Black body radiation ii) Compton effect
4. State and Explain the postulates of quantum mechanics
5. What is partition function? Calculate rotational partition function for hydrogen gas at 27°C.Moment of inertia of hydrogen molecule is 0.459 x 10^{-40}g/cm^2 and the symmetry number $\sigma = 2$.
6. Write the Michaelis - Menten equation for enzyme catalysis. Verify it by studying the effect of substrate concentration and pH
7. Determine the de Broglie wavelength (in nm) associated with a neutron travelling at a speed of 5.0×10^3 m/s. The mass of a neutron is 1.67×10^{-24} g.
8. Mention the conditions of well-behaved wave function and identify which of the following functions are acceptable as a wave function & comment on it.
   i) $\psi = e^x$ ii) $\psi = \sin x$ iii) $\psi = x$

Section B

Part A

Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Compare the Maxwell- Boltzmann, Fermi- Dirac and Bose - Einstein statistics
10. Discuss the Einstein's model for the heat capacity of solids
11. Explain the Rice - Herzfeld mechanism for the thermal decomposition of acetaldehyde
12. a) A microscope using suitable photons is employed to locate an electron in an atom within distance of 0.1 A°. What is the uncertainty involved in the measurement of velocity? (5)

Contd...

b) Differentiate the quantum mechanics from classical mechanics.(5)

Part B

Compulsory question $(1 \times 10 = 10$ Marks)

13. a) Set up Schrödinger wave equation for a particle in 1-D box and derive its Eigen value energy. (8)
b) Consider a particle in a cubical box. What is the degeneracy of the level' that has an energy thrice that of the lowest level? (2)

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