UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

CHEMISTRY (HONOURS)

8th Semester

Course No. : BSCH - 802

(Physical Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Write down the approximations suggested by Erich Huckel for the construction of molecular orbital energy level diagram. 2

   (b) Using Huckel approximation find out the energies of the ∏-orbitals of cyclobutadiene. 8

Or

2. (a) Setup and solve the matrix equation within the Huckel approximation for linear H_3. 8

   (b) What is delocalization energy? 2

3. (a) Write a detailed note on Standard Hydrogen Electrode (SHE). 5

   (b) What is liquid junction potential? 3

(Turn Over)

(c) Define ionic strength (electrolytic solution). 2

Or

4. (a) Write a detailed note on glass electrode. 5

(b) Write down the differences between conductometric and potentiometric titrations. 3

(c) Give example of electrolyte concentration cell without transference (one example). 2

5. (a) Which observation of photoelectric effect could not be explained by the laws of classical physics? 2

(b) Estimate the potential energy of an electron in Li^{2+} ion in terms of r and e (terms have their usual meaning). 4

(c) The wave function, $\psi(\phi)$, for the motion of a particle in a ring is of the form $\psi = N\exp(-\, im_l\phi)$. Determine the normalization constant, N. 4

Or

6. (a) Find r_{rms} for H atom in 1s orbital. 5

(b) By the method of separation of variables, show that the wave-function for a particle on a sphere could be written as, $\psi(\theta,\phi) = \Theta(\theta)\phi(\varphi)$ and find the ϕ independent equation of Θ. 5

7. (a) Write down the definitions of rate, order, and molecularity of a chemical reaction. 3

(b) Prove that the half-life of nth order reaction, $t_{1/2} \propto {}^{1}/_{a^{n-1}}$ 4

(c) The rate constant for the decomposition of a certain compound is 1.70×10^{-2} dm^3 moL^{-1} s^{-1} at 24^0c and 2.01×10^{-2} dm^3 moL^{-1} s^{-1} at 37^0c. Evaluate the Arrhenius parameters of the reaction. 3

Or

8. (a) Write a note on the method of half life period for the determination of order of a reaction. 5

(b) Discuss the collision theory of reaction rates. 5

9. (a) How micelle is formed? 3

(b) How the structure of snfactants affects the critical micelle concentration in aqueous medium? 6

(c) Define conducting polymers. 1

Or

10. (a) What is liquid crystal? How the smectic phase is formed? 2+4=6

(b) What is Hardy-Schultze rule? 2

(c) How many types of liquid crystals are there? 2

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