

Rayat Shikshan Santha's  
**Rajarshi Chhatrapati Shahu College, Kolhapur**  
B.Sc. (Part-III, Sem-V) Preliminary Examination  
Subject: Physical Chemistry (Paper-IX)

**Day and Date:** Thursday, 10<sup>th</sup> Oct, 2019

**Time:** 12:00 to 02:00 pm

**Marks:** 40

- Instructions:**
1. All questions are compulsory
  2. Figures to the right indicate full marks
  3. Scientific calculator is allowed for calculations

**Q.1.** Select most correct alternative for each of the following and rewrite the sentences. 8 Marks

**a)** The equation  $(\Delta x)(\Delta P_x) \geq h$  is called as

- a) Einstein equation      b) de-broglie hypothesis  
c) Schrodinger equation      d) Heisenberg uncertainty principle

**b)** ISC means.....

- a) Internal Conversion      b) External Conversion  
c) Intersolution concentration      d) Intersystem Crossing

**c)** For rotational transition selection rule is

- a)  $\Delta J = \pm 1$       b)  $\Delta V = \pm 1$   
c)  $\Delta E = \pm 1$       d) none of these

**d)** In vibrational spectra, the transition from  $v = 0$  to  $v = 1$  gives a very intense line known as

- a) overtone band      b) fundamental band  
c) dark line      d) none of these

**e)** Solution which obeys the Raoult's law of all concentrations and temperatures are called.....

- a) real solution      b) ideal solution  
c) binary solution      d) none of these

**f)** The equation  $\Delta G = -nEF$  represents

- a) maximum work      b) free energy  
c) both a and b      d) electrical work

**g)** The cell that converts electrical energy into chemical energy is known as.....

- a) electrolytic cell      b) voltaic cell  
c) galvanic cell      d) none of these

**h)** An electrode at which oxidation occurs is called.....

- a) cathode      b) null electrode  
c) anode      d) reference electrode

**Q.2.** Attempt the following. (any 2) 20 Marks

**a)** Discuss the vibrational spectra of diatomic molecule. Explain the overtone band.

**b)** Discuss in detail, "Jablonski diagram".

**c)** Derive an expression for emf of an electrolyte concentration cell with transference reversible to cation. Standard emf of the galvanic cell is 0.45. calculate equilibrium constant of the cell if  $2.303RT/nF = 0.03$ .

**Q.3.** Write short note on. (any 3) 12 Marks

**a)** de-Broglie hypothesis

**b)** Quantum yield and factors affecting on it.

**c)** Mention the types of electrodes. Explain any one of them.

**d)** Application of emf measurement in determination of pH.

**e)** Difference between ideal and non-ideal solutions.