



# UNIVERSITY OF THE PUNJAB

Fifth Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig. ....

Roll No. in Words. ....

PAPER: Physical Chemistry

MAX. TIME: 15 Min.

Course Code: CHEM-301 Part-I (Compulsory)

MAX. MARKS: 10

Signature of Supdt.:

**Attempt this Paper on this Question Sheet only.**

**Please encircle the correct option. Division of marks is given in front of each question.**

**This Paper will be collected back after expiry of time limit mentioned above.**

**Q.1. Encircle the right answer, cutting and overwriting is not allowed. (1x10=10)**

- (1) Electrolytic conduction differs from metallic conduction from the fact that in the former:
- The resistance increases with the increasing temperature.
  - The resistance decreases with increasing temperature.
  - The resistance remains constant with increasing temperature.
  - The resistance is independent of the length of the conductor.
- (2) Identify the correct statement regarding fuel cells.
- They are more efficient.
  - They are free from pollution.
  - They run till the reactants are active.
  - All of these.
- (3) A cell reaction is spontaneous if the cell potential is
- Zero
  - Negative
  - Positive
  - Infinite
- (4) In which of the following the free energy of a chemical reaction is directly converted to electricity.
- Lead storage battery
  - Fuel cell
  - Concentration cell
  - Lochlanche cell
- (5) When the temperature is raised, the rate of the reaction increases because
- Lowering of activation energy
  - Increase in number of collisions
  - Decrease in number of active molecules
  - Decrease in number of collisions
- (6) The reaction,  $2\text{O}_2 \longrightarrow 3\text{O}_2$  proceeds in two steps. The rate law for the overall reaction
- $r = k [\text{O}_3][\text{O}_2]$
  - $r = k [\text{O}_3]^2$
  - $r = k [\text{O}_3]^2[\text{O}_2]^{-1}$
  - $r = k [\text{O}_3] [\text{O}_2]^2$
- (7) The reaction,  $2\text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O} + \text{O}_2$  is a
- Zero order reaction
  - 1<sup>st</sup> order reaction
  - 2<sup>nd</sup> order reaction
  - 3<sup>rd</sup> order reaction
- (8) Laplacian operator is a
- Integral operator
  - additional operator
  - Subtraction operator
  - differential operator
- (9) The operator " $\sqrt{\quad}$ " is
- Linear operator
  - diagonal operator
  - Not linear
  - straight line operator
- (10)  $\Psi$  is symbol used for
- Velocity of the wave
  - amplitude of the wave
  - Density of the wave
  - none of the above



# UNIVERSITY OF THE PUNJAB

Fifth Semester – 2019

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**PAPER: Physical Chemistry**

**Course Code: CHEM-301 Part – II**

**MAX. TIME: 2 Hrs. 45 Min.**

**MAX. MARKS: 50**

**ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED**

Q.2- Attempt all the short questions (2×10=20)

- Explain Arrhenius Factor.
- Discuss the effect of temperature and concentration on equivalent conductance.
- Define orthogonality and normalization of wave function?
- Prove that  $I = \mu r^2$
- Justify: the reaction in the solution phase is faster than those in the solid phase?
- What are Eigen function and Eigen values? Give one example of each.
- Gives various steps in thermal decomposition of Acetaldehyde and also indicate the rate determining step.
- Briefly explains Ostwald's Dilution Law?
- What is tunnel effect? Give an example?
- Why Debye- Huckel law is valid only for dilute solution?

### Section 2

Attempt all questions

Q.3- (a) Drive a rate expression for 3<sup>rd</sup> order reaction, when initial concentration of two reactants is same but that of 3<sup>rd</sup> one is different. (7)

(b) What is parallel reaction? Give its types? (3)

Q.4- (a) Calculate vibrational frequency for Harmonic Oscillator (3)

(b) Give mathematical quantum mechanical description of diatomic rigid states. (7)

Q.5- (a) What is activity coefficient? Determine the activity coefficient for sparingly soluble electrolytes? (5)

(b) Derive an expression of EMF of concentration cell with transference? (5)