Pabna University of Science & Technology

Department of Electrical & Electronic Engineering

B. Sc. Engineering Special examination 2021

Course Title: Chemistry

Course No: Ch-1103

Time 3.00 hours Full Marks: 70 (35+35)

N. B: (i) Answer any three questions out of four for the each part.

(ii) Separate Answer script must be used for answering the questions of Part-A & Part-B.

(iii) Figures in the right margin indicate marks.

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| 1. | (a) | Define specific conductance, conductivity, equivalent conductivity and molar conductivity. What are the relations between them? What effect do they produce upon dilution? | 6.0 |
| (b) | The specific conductance of an N/50 solution of KCl at 25 ºC is 0.002765 mho. If the resistance of a cell containing this solution is 400 ohms, what is the cell constant? | 3.0 |
| (c) | Describe galvanic cell in which electrical current is generated. | 2.67 |
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| 2. | (a) | Define equilibrium constant and show that it can have two different values depending on how you express concentration. Derive relationship between these two values. | 4.0 |
| (b) | What is Le Chatelier’s principle? Discuss its applications. | 5.0 |
| (c) | How are *K*p, *K*c and *K*a related? | 2.67 |
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| 3. | (a) | Define order of a reaction, molecularity of a reaction and half life period. Show that for first order reactions the half life period is independent of the initial concentration. | 6.0 |
| (b) | If the rate constant at one temperature alongwith the activation energy is given, how can the rate constant at any other temperature be determined? | 4.0 |
| (c) | Explain, with examples, zero-order reaction. | 1.67 |
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| 4. | (a) | What is electrophoresis? How does this phenomenon provide information about the sign of charge on particles. | 5.0 |
| (b) | What is a colloid? Discuss the essential difference between lyophillic and lyophobic colloids. | 5.0 |
| (c) | What are gels? Give examples. | 1.67 |
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| 5. | (a) | Why do all atoms of an element have the same atomic number, although they may have different mass numbers? | 3.67 |
| (b) | What do you understand by the term, “ Quantum number”. How many quantum numbers has an electron in an orbital? Explain the significance of each quantum number. | 5.0 |
| (c) | Define : (a) Absorption (b) Emission | 3.0 |
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| 6. | (a) | What is valence bond theory? How does it differ from the Lewis concept of chemical bonding? | 4.0 |
| (b) | Use molecular orbital theory to explain why the Be2 molecule does not exist. | 3.67 |
| (c) | Define the following terms: bonding molecular orbital, anti bonding molecular orbital, pi molecular orbital, sigma molecular orbital. | 4.0 |
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| 7. | (a) | Show that Methane and ammonia contain covalent linkages among their respective atoms? | 5.0 |
| (b) | In methane, ammonia and water molecule the bond angle is decreasing. Explain giving reasons. | 5.0 |
| (c) | Why the bond angle in H2S is less than H2O? | 1.67 |
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| 8. | (a) | How does the size of atoms vary from left to right in a period and on descending a group in the periodic table? What are the reasons for these changes? | 3.67 |
| (b) | Discuss the origin of paramagnetism and diamagnetism in transition elements. | 4.0 |
| (c) | What do you mean by f-block elements? Why f-block elements are called inner transition elements? | 4.0 |
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