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Council for Technical Education and Vocational Training  
**Office of the Controller of Examinations**  
Sanothimi, Bhaktapur  
**Regular Exam-2079, Ashad**

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| <b>Program:</b> Diploma in Engineering All | <b>Full Marks: 60</b> |
| <b>Year/Part:</b> I/I (2021 New Course)    | <b>Pass Marks: 24</b> |
| <b>Subject:</b> Engineering Chemistry-I    | <b>Time: 3 hrs</b>    |

*Candidates are required to give their answers in their own words as far as practicable.  
The figures in the margin indicate full marks.*

**Attempt All questions.**

1. What do you mean by valency and variable valency? Explain symbol and its significance. [4]
2. What is the significance of given chemical equation: [4]  
$$\text{CaCO}_3 + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$$
3. What do you mean by atomic mass unit? 0.5302 gram of metal yield 0.7052 gram of its chloride. The specific heat of the element is 0.059. Calculate the exact atomic weight of Metal. [4]
4. What do you mean by gram molecular weight? How can you prove that hydrogen, chlorine and nitrogen are diatomic gases according to Avogadro's hypothesis? [4]
5. What do you mean by equivalent weight of metal? Explain, the determination of equivalent weight of metal by indirect oxide formation method. [4]
6. 0.212 gram of metal where dissolved in dilute HCL evolves 218.2cc of hydrogen at 17°C and 745.5 mm Hg pressure over water. Find the equivalent weight of the metal (Aq. tension at 17°C=14.4 mm Hg). [4]
7. Explain Arrhenius concept of acid and base with its limitations. [4]

**OR**

Calculate the  $[\text{H}^+]$  and  $[\text{OH}^-]$  in 0.2M HCl solution.

8. What do you mean by molarity? Also mention the characteristics of primary standard substances. [4]

**Cont.....**

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9. What are the basic assumptions of the electronic theory of valency? Write down the electron dot structure of: [4]  
a)  $H_2O$                       b)  $NH_3$                       c)  $C_2H_2$

10. What do you mean by electrolysis? Calculate the mass of copper deposited by electrolysis on passing 2.5A current for 45 minutes through the solution of  $CuSO_4$ . (Atomic weight of copper is 63.5). [4]

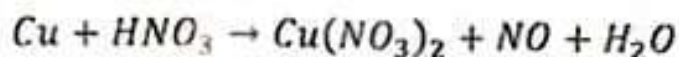
OR

Define Faraday? Explain about Faraday's first law of electrolysis.

11. State Mendeleev's periodic law. Explain the periodic table of Mendeleev's. What are its advantages? [4]

12. What do you mean by redox reaction? Explain how the oxidation and reduction go side by side. [4]

13. Balance the redox reaction by oxidation number method:



14. What do you mean by quantum numbers; explain. [4]

15. Explain the postulates of Bohr's atomic model. [4]

**Good Luck !**

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