

DR.B.C.Roy Engineering College, Fuljhore, Jemua Road, Durgapur – 713206



CA3/Paper Name: Chemistry-1

Paper Code: BS-CH101

Department: ECE1

Full Marks : 25

Time : 50 Minutes

Date : 15/12/2022

Answer Any Five

1. Prove that $\left(V - \frac{h^2}{8\pi^2 m \nabla^2}\right) \Psi = E\Psi$ 5 [CO1](A+U+R+P)
2. Explain the paramagnetic behavior of oxygen molecule under the light of M.O. theory 5 [CO1](A+P+U)
3. Define Van der Waal's forces. Discuss their nature. 2 + 3 [CO1] (U+R+P)
4. Write the equation of state for the real gas with proper notations. Mention the significance of constants a and b. 5 [CO1] (U+R+P)
5. Explain the term chemical potential. Derive the relation of EMF of cell with ΔG and ΔH . 1+ 4 [CO2] (U+R+P+E)
6. Show that, entropy of mixing of ideal gases $\Delta S_{\text{mix}} > 0$. 5 [CO2] (U+R+E)

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CA3 /Paper Name: Chemistry-1

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Full Marks : 25

Time : 50 Minutes

Date : 15/12/2022

Answer Any Five

1. What is zero point energy of a particle in one dimensional box? Why the energy of this particle cannot be zero at zero point energy? 2 + 3 [CO1] (U+R+P+E)
2. Set up the Schrodinger equation for a particle in a one – dimensional box. 5 [CO1] (A+U+R)
3. Why in case of hydrogen and helium, the compressibility factor is always greater than 1 and increases with increase in pressure? Why gases can be liquefied by cooling? 2 + 3 [CO1] (A+U+P)
4. Discuss the critical phenomenon of real gas. Calculate the Boyle temperature for a gas whose van der Waals constant $a = 7.18 \text{ L}^2 \text{ atm Mol}^{-2}$, $b = 0.854 \text{ L Mol}^{-1}$ and $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$ 2 + 3 [CO1] (A+U+E)
5. For a reaction both ΔH and ΔS are positive. Under what conditions will the reaction be spontaneous? What is state function? Give example. 3 + 2 [CO2] (A+P+E)
6. State whether the following properties are extensive or intensive properties: Pressure, Concentration, Entropy, Viscosity, Temperature. 5 [CO2] (U+R+E)