



CS/B.TECH(H)/EVEN/ATA 2/2002/202A 202A/033
MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL
Paper Code : BSCI201 Chemistry-I (Gr. A)
UPID : 002002

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

[1 × 10 = 10]

1. Answer any ten of the following :

- (i) Write the reagents of nitration of benzene.
- (ii) Write the value of quantum numbers n , l and m for $2s$ orbital.
- (iii) MRI is the application of which spectroscopic method?
- (iv) London forces or dispersion forces operates between _____.
- (v) How the entropy of the system changes when water is frozen?
- (vi) What is Hard-soft acid base principle?
- (vii) If two stereoisomers of tartaric acid have $2S$, $3R$ and $2S$, $3S$ configurations, then they are _____.
- (viii) What are the conditions of Cannizzaro reaction?
- (ix) State whether naphthalene is aromatic, antiaromatic or nonaromatic and give reason.
- (x) Write the equation of rotational constant B of a molecule.
- (xi) What is the value of critical coefficient?
- (xii) Write the half-cell representation of saturated calomel electrode.

Group-B (Short Answer Type Question)

[5 × 3 = 15]

Answer any three of the following :

1. What is the role of Lewis acid in halogenation of benzene? Write the structure of the substrate which on ozonolysis will provide acetone as the only product. [5]
2. Write the significance of van-der Waal's constants. [5]
3. What are conformational isomers? Explain by taking ethane as an example. Draw the potential energy diagram of ethane. [5]
4. Prove that for a constant pressure process, where work is only mechanical, the heat absorbed by the system (Q_p) is equal to the increase in enthalpy (ΔH). <https://www.makaut.com> [5]
5. NO is paramagnetic while NO^+ is diamagnetic. Justify using MO diagram. Write electronic configuration of NO. [5]

Group-C (Long Answer Type Question)

[15 × 3 = 45]

Answer any three of the following :

7. (a) Define 'Standard cell' with example. [3]
- (b) Find the relation between ΔH and ΔU for an ideal gas undergoing a P-V type mechanical work as follows:
 $\Delta H = \Delta U + \Delta nRT$ [4]
- (c) Discuss any one statement of First law of thermodynamics and explain it mathematically. [4]
- (d) Explain 'Galvanic cell corrosion'. [4]
8. (a) Demonstrate the shape of the following compounds. [8]
- (i) ClF_3 (ii) XeF_2 (iii) BrF_5 (iv) SCl_6
- (b) Arrange NH_3 , H_2O , CH_4 according to increasing bond angle stating the reason. [4]
- (c) Dipole moment of BF_3 is zero while that of NF_3 is 0.24D. Justify. [3]
9. (a) Derive Schrodinger Equation. [5]
- (b) Write the conditions of acceptable wave function ψ . [5]
- (c) Write short note on extrinsic semiconductor and its types. [5]
10. (a) What will be the product/ products if $CH_3CH=CH_2$ is reacted with HBr ? Show the steps of reaction. [5]

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- (b) What change will be observed in the above reaction if peroxide is added along with HBr? { 2 }
- (c) Choose the more suitable substrate of E1 reaction between tertiary-butyl chloride and methyl chloride. Give reason. { 3 }
- (d) Explain the stereo chemical aspects of SN^1 and SN^2 reactions with suitable examples. { 5 }
11. (a) Calculate the CFSE and Magnetic moment of $K_3[FeF_6]$. { 5 }
- (b) Calculate the CFSE of both high spin and low spin complexes of d^7 and d^4 complexes. { 5 }
- (c) Give the molecular energy level diagram of CO. Comment on magnetic behaviour and bond order. { 5 }

*** END OF PAPER ***



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