SM – 352

II Semester B.Sc. Examination, May/June 2018
(CBCS) (2014-15 and Onwards) (F + R)
CHEMISTRY – II

Time : 3 Hours Max. Marks : 70

Instructions : *i) The question paper has* ***two*** *Parts. Answer* ***both*** *Parts.*
ii) Write equations, draw diagrams ***wherever*** *necessary.*

PART – A

I. Answer **any eight** of the following questions. **(8×2=16)**

1) Write the values of quantum numbers for $2s^1$ electron.
2) Calculate the energy associated with Bohr's 2^{nd} orbit, given the energy of Bohr's 1^{st} orbit = -2.17×10^{-18}J.
3) What is the physical significance of Ψ and Ψ^2 ?
4) Define lattice energy.
5) Write the electronic configuration of oxygen molecule using MOT.
6) Give one example each of molecule having inter-molecular hydrogen bond and intramolecular hydrogen bonding.
7) What are orthosilicates ? Give an example.
8) Mention any two applications of Neon.
9) Calculate magnetic moment of Fe^{2+} ion (atomic number of iron = 26).
10) Explain Ullmann reaction with an example.
11) Write the cis and trans isomers of stilbene.
12) Mention the ortho and one meta orienting group of benzene.

PART – B

II. Answer **any nine** of the following questions. **(9×6=54)**

13) a) Explain the terms : (i) Hamiltonian operator (ii) Laplacean operator.
b) Write de Broglie's equation, explain the terms. **(4+2)**

14) a) Derive an expression for the radius of n^{th} orbit of hydrogen atom.
b) Calculate the wavelength of a moving ball of mass 0.2 kg travelling with a velocity 150 m/s, h = 6.63×10^{-34} Js. **(4+2)**

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15) a) Derive Schrodinger's wave equation.
b) Define the term orbital in an atom. (4+2)

16) a) Set up Born-Haber cycle for the formation of NaCl crystal, write the expression for lattice energy.
b) How lattice energy affects the solubility of an ionic crystal ? (4+2)

17) a) Discuss the structure of BrF_3 molecule based on VSEPR theory.
b) Why is H_2O liquid and H_2S is a gas at room temperature ? (4+2)

18) a) Write the molecular orbital diagram of nitrogen molecule and calculate the bond order.
b) What are polar molecules ? Give examples. (4+2)

19) a) What are transition elements ? Why they (i) Exhibit variable oxidation states (ii) Form complex salts.
b) What are zeolites ? Mention one application. (4+2)

20) a) Describe the separation of lanthanides by ion exchange method.
b) Why Cu^{2+} ion is coloured, while Cu^{+} ion is colourless. (4+2)

21) a) How is Helium isolated from natural gas ?
b) Write the reaction of oxidation of toluene by chromyl chloride. (4+2)

22) a) Write the mechanism of nitration of benzene.
b) State Huckel's rule of aromaticity. (4+2)

23) a) Explain mechanism of S_N1 reaction with an example.
b) Explain Birch reduction reaction. (4+2)

24) a) Elucidate the structure of benzene using molecular orbital theory.
b) State Saytzeff rule, give an example. (4+2)

25) a) Explain mechanism of E_1 (Elimination) reaction with a suitable example.
b) Why vinyl chloride is less reactive than ethyl chloride ? (4+2)
