SECTION – C

Answer **any 4** questions. **Each** carries a weightage of **2**.

13. Define ionisation energy of an element. Explain the variation of first ionisation energy values along second period elements from Be to O.

14. What is H-bonding ? What are the types of H-bonding ? Give examples.

15. What is mass defect ? How is it related to binding energy ?

16. Write briefly on radiocarbon dating.

17. What is Kohlraush's law ? Give its important applications.

18. Draw and explain the conductometric titration curves of :
    i) strong acid against strong base and
    ii) strong acid against weak base. **(Weightage 4×2=8)**

SECTION – D

Answer **any 2** questions. **Each** carries a weightage of **4**.

19. What are quantum numbers ? Explain the significance of different quantum numbers.

20. Define lattice energy of an ionic solid and mention its significance. Explain Born-Haber cycle by taking Nacl as example.

21. Write notes on :
    i) Nuclear fusion
    ii) Applications of radioisotopes. **(Weightage 2×4=8)**

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Reg. No. : .....

Name : .....

I Semester B.Sc. Degree (CCSS – Supple./Improv.) Examination, November 2014
COMPLEMENTARY COURSE IN CHEMISTRY
1C01 CHE : Chemistry for Physical and Biological Sciences
(2013 and Earlier Adm.)

Time : 3 Hours Max. Weightage : 25

SECTION – A

Answer **all** questions. Choose the appropriate option. **Each** bunch of **four** questions carries a weightage of **1**.

1. i) The three electrons in the 2P level of nitrogen atom are placed in three different orbitals, in accordance with
   A) Pauli's exclusion principle B) Hund's rule
   C) Aufbau principle D) Extra stability of half filled orbitals

   ii) The part of H-spectrum, in the visible region is
   A) Balmer series B) Lyman series
   C) Brackett series D) Pfund series

   iii) In the long form of the periodic table, the 'd' block elements are present, mainly in
   A) Groups 2 to 12 and periods 3 to 5 B) Groups 3 to 12 and periods 3 to 6
   C) Groups 3 to 12 and periods 4 to 6 D) Groups 3 to 13 and periods 3 to 5

   iv) The electron affinity of halogens, is in the order
   A) F > Cl > Br > I B) I > Br > Cl > F
   C) Cl > Br > F > I D) F < Cl > Br > I

2. i) Different types of bond angles are present in
   A) PCl_5 B) SF_6 C) NH_3 D) NH_4^+

   ii) Ionic, covalent and coordinate bonds are present in
   A) NH_4^+ B) PCl_5 C) SF_6 D) $CuSo_4 \cdot 5H_2O$

iii) A paramagnetic species among the following is

A) N_2 B) O_2^{2-} C) O_2 D) O_2^{2+}

iv) The bond order of B_2, N_2, O_2 and O_2^+ is in the order

A) $N_2 > O_2 > O_2^+ > B_2$ B) $N_2 > O_2^+ > O_2 > B_2$

C) $O_2 > O_2^+ > N_2 > B_2$ D) $B_2 > O_2 > O_2^+ > N_2$

3. i) The number of α and β particles emitted during the conversion of $^{238}_{92}U$ to $^{206}_{82}Pb$ are

A) 8α and 6β B) 8α and 4β C) 8α and 6β D) 6α and 8β

ii) Which is not true ?

A) During γ-emission mass number and atomic number of an element remains unchanged

B) Radioactivity was discovered by Henri Becquerel

C) Hydrogen bomb works on the principle of nuclear fission

D) β particles are high speed electrons

iii) When the n/p ratio is very high, the atomic nucleus undergoes ?

A) Positron emission B) Proton emission

C) Neutron emission D) β-emission or neutron emission

iv) Artificially prepared transuranic elements are present in

A) Thorium series B) Neptunium series

C) Actinium series D) Uranium series

4. i) Which among the following is incorrect ?

A) Transport number of anion = $\frac{\text{Current carried by anion}}{\text{Total current passed}}$

B) $\frac{\text{Speed of anion}}{\text{Speed of cation}} = \frac{\text{Transport number of anion}}{\text{Transport number of cation}}$

C) $\frac{\text{Speed of anion}}{\text{Speed of cation}} = \frac{\text{Fall in concentration around anode}}{\text{Fall in concentration around cathode}}$

D) Transport number of cation = $\frac{\text{Fall in concentration around anode}}{\text{Total fall in concentration}}$

ii) The SI unit of molar conductance is

A) $S\ cm^2\ mol^{-1}$ B) $S\ m^{-2}\ mol^{-1}$

C) $S\ m^{-2}\ mol^{-2}$ D) $S\ m^2\ mol^{-1}$

iii) From conductivity data, the degree of dissociation of a weak electrolyte is given by

A) $\alpha = \lambda^C / \lambda^\circ$ B) $\alpha = \lambda^\circ_+ / \lambda^\circ_-$

C) $\alpha = \lambda^\circ / \lambda$ D) $\alpha = \frac{\lambda^\circ_+ + \lambda^\circ_-}{\lambda^\circ}$

iv) Two electrolytic cells, one containing acidified $FeCl_2$ and the other containing acidified $FeCl_3$ are electrolysed using the same quantity of electricity. The mass of iron deposited in the respective cathodes is in the ratio

A) 1 : 1 B) 3 : 2

C) 2 : 3 D) 2 : 1 **(Weightage 4×1=4)**

SECTION – B

Answer **any 5** questions. **Each** carries a weightage of **1**.

5. Derive the Louis de Broglie equation.

6. What is screening effect of electrons ? Give its order.

7. Calculate the uncertainty in the position of an electron moving with a velocity $2 \times 10^6\ ms^{-1}$ and uncertainty in velocity 0.01%.

8. Illustrate dsp^2 hybridisation with a suitable example.

9. Write the MO configuration of N_2 molecule.

10. What are the important features of VB theory ?

11. A sample of wood has $^{14}C/^{12}C$ ratio 15% that of a fresh sample. Calculate the age of the sample. $t^1/_2$ for ^{14}C is given as 5760 years.

12. The resistance of a 10^{-2} molar solution of a weak electrolyte is 5×10^3 ohm, when measured in a conductivity cell of cell constant $0.5\ cm^{-1}$. Calculate the molar conductance of the solution. **(Weightage 5×1=5)**