UG Even Semester (CBCS) Exam., May—2017

(Honours)

(6th Semester)

Course No. : BSED–602

Full Marks : 50
Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

Chemistry students will answer BSCH–602 and Zoology students will answer BSZH–602

CHEMISTRY

(Honours)

Course No. : BSCH–602

(Inorganic Chemistry)

1. *(a)* State the law of 'constancy of interfacial angles'. 2

(b) A crystal plane has intercept on the three axes at *a*, 2*b* and 3*c*. Calculate the Miller indices. 2

(c) Explain the terms Schottky defect and Frenkel defect. 3

(d) Calculate the lattice energy of sodium bromide from the following information : 3

Sublimation energy (Na) = 113 kJ
Ionization energy (Na) = 502 kJ
Bond energy (Br—Br) = 187 kJ
Electron affinity (Br) = 324 kJ
Heat of formation (NaBr) = –359 kJ

OR

2. *(a)* Write the symmetry elements present in cubic crystal. 3

(b) Calculate the longest wavelength of X-ray that may be used to determine a lattice spacing of 1 Å by the Bragg reflection method. 4

(c) An orthorhombic unit cell has the following parameters :

a 0 5 Å, b 1 Å, c 1 5 Å

What is the spacing of the (1, 2, 3) planes? 3

3. *(a)* Define auxochrome and chromophore with suitable examples. 3

(b) Write one method with suitable example for the synthesis of polynuclear carbonyls from mononuclear ones. 2

(c) Which one has greater M—C (M=metal) bond strength between $Cr(CO)_6$ and $[Mn(CO)_6]$ and why? 3

(d) What do you mean by pi ( ) acid ligands? 2

OR

4. *(a)* Explain fingerprint region. 3

(b) Mn(II) is very pale in colour and weakly absorbing. Explain. 4

(c) Both Ni(0) and Zn(II) are isoelectronic but Ni(0) forms tetracarbonyl while Zn(II) fails. Explain why. 3

5. *(a)* Write the S_N1 ligand substitution reaction mechanism in octahedral complexes. 5

(b) Write a short note on outer-sphere electron transfer mechanism. 5

OR

6. *(a)* Apply the principle of *trans* effect to synthesize *cis*- and *trans*-$[Pt(NH_3)_2Cl_2]$. 3

(b) Compare S_N1 and S_N2 ligand substitution reaction in octahedral complexes. 3

(c) Explain briefly the concept of thermodynamic and kinetic stability of complexes with suitable examples. 4

7. *(a)* Among the carbonyl and nitrosyl linkages, which one is stronger? How is it proved? 4

(b) Explain terminal and bridging carbonyl group with suitable example. Compare their carbonyl frequencies. 2

(c) Write the structure of bis-dimethyl glyoximato nickel(II). 2

(d) Why pure nitrosyls are absent? 2

OR

8. *(a)* Define crystal field stabilization energy (CFSE). 2

(b) For $[Cr(H_2O)_6]^{2}$ ion, the mean pairing energy is found to be 23500 cm^{1}. The magnitude of crystal field splitting energy ($_0$) 13900 cm^{1}. Calculate the CFSE for the complex corresponding to high-spin and low-spin state. Which is the most stable and why? 4

(c) Calculate the number of unpaired electrons for the complex $[CoCl_4]^2$ and its magnetic moment. 2

(d) Write two postulates of crystal field theory (CFT). 2

9. (a) How will you extract iron from its ore? 4

(b) Write the general features of the *d*-block elements. 3

(c) Write a comparative discussion between *d*-block transition elements and non-transition elements. 3

OR

10. (a) What is lanthanide? 2

(b) Explain lanthanide contraction. 2

(c) Write two similarities and two differences between lanthanides and actinides. 2

(d) Describe one suitable method for the separation of lanthanide from monazite. 4

ZOOLOGY

(Honours)

Course No. : BSZH–602

(Physiology and Bioinformatics)

1. (a) How do biotic and abiotic environments cause stress? 4

(b) Explain the adrenal medullary stress response mechanism. 6

OR

2. (a) How does a body produce heat in case of homeotherms? 3

(b) Describe the concept of homeostasis with the help of a suitable example. 7

3. (a) What is meant by acclimatization? 3

(b) Mention the methods and cite examples of acclimatization. 7

OR

4. (a) Describe the mechanism of cell volume regulation. 6

(b) Write a note on ionic stress. 4

5. *(a)* What is osmoregulation? 2

(b) Describe the process of osmoregulation in any *two* of the following : 8

(i) Freshwater environment

(ii) Marine water environment

(iii) Terrestrial environment

OR

6. *(a)* Describe the phenomenon of bioluminescence in animals. 5

(b) Write down the chemistry behind bioluminescence. 5

7. *(a)* Define bioinformatics. 2

(b) Give an account on the application of computers in the field of biology. 8

OR

8. *(a)* What is an operating system? 4

(b) Describe the concept of Windows as operating system. 6

9. *(a)* What is meant by internet? 4

(b) Enlist the advantages and disadvantages of internet usage. 6

OR

10. *(a)* Explain the organization and important features of Human Genome Project. 8

(b) Enlist the applications of Human Genome Sequencing. 2

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