# 2018

## CBCS

## 1st Semester

## CHEMISTRY

### PAPER—GE1T

### (Honours)

*Full Marks : 40*

*Time : 2 Hours*

*The figures in the right-hand margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

*Illustrate the answers wherever necessary.*

### *Inorganic Chemistry—I*

### *Group—A*

1. Answer any *five* questions : 5×2

(a) What is the significance of negative sign in Bohr's equation for energy of an electron in a hydrogen like atom ?

(b) Write the conjugate bases of the following species: $[Fe(H_2O)_6]^{3+}$ and $HSO_4^-$.

(c) $CH_2 = CH - Cl$ does not participate in $SN^2$ reaction —Why ?

(d) Write two differences between electronegativity and electron affinity.

(e) What do you mean by optically active compounds ?

(f) What do yo mean by "Shielding effect" ?

(g) Why *p*-nitrophenol is more acidic than phenol ?

(h) Arrange the following carbocations in order of stabilities —

$$CH_3 - CH = CH - \overset{\oplus}{C}H_2, \quad CH_3 - CH_2 - CH_2 - \overset{\oplus}{C}H_2, \quad C_6H_5 - \overset{\oplus}{C}H_2$$

Give reason.

## Organic Chemistry—I

### *Group—B*

**2.** Answer any *four* questions : 4×5

(a) $H_3BO_3$ is a very weak acid (pka = 9.2) but in presence of any cis – 1, 2 diol it behaves as a strong acid. Explain. 2

(b) $CH_3 - CH_2 - CH_2 - \underset{\overset{\oplus}{N(CH_3)_3}}{CH} - CH_3 \xrightarrow[EtOH]{NaOEt}$ 1-Pentene + 2-Pentene
96% 4%

Explain the product distribution. 3

**3.** (a) Write down three postulates of Bohr's atomic model. 3

(b) $CH_3 - CH = CH_2 \xrightarrow{B_2H_6} A \xrightarrow{H_2O_2/NaOH} B.$

Identify A – B. 2

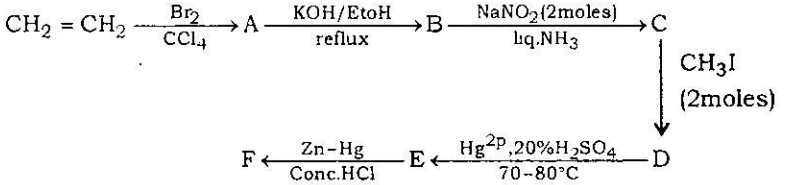
**4.** (a) Arrange the following species in order of acidity in both $H_2O$ and $CH_3CO_2H$ medium. Give reason in each case. HCl, $HNO_3$, $H_2SO_4$. 3

(b) Write down the resonating structure of the following ions.

(i) $CO_3^{2-}$ (ii) $CH_3COO^{\ominus}$ 2

**5.** (a) Write down the electronic configuration of $Cr^{3+}$ and $Cu^{2+}$ ions. 2

(b) Identify A to E. 3




**6.** (a) Although Zn, Cd and Hg are the members of 'd'-Block in the periodic table, they are not called as transition elements. Explain. 2

(b) Designate R/S nomenclature of L-lactic acid and D-glyceraldehyde. 3

**7.** (a) Arrange the following species in order of decreasing acidity. $BF_3$, $BCl_3$, $BBr_3$ and $BI_3$. 3

(b) Predict the products of ozonolysis of 2-butene. 2

## *Group—C*

**8.** Answer any *one* question : $1 \times 10$

(a) State Hund's rule. Applying the rule, find out the number of unpaired electron in an atom having atomic number 15. 2

(b) Write down the Fisher projection of meso-Tartaric acid and convert it to Newman projection. 3

(c) Predict the direction of chemical reaction :

$$BF_3H^- + BH_3F^- \rightleftharpoons BF_4^- + BH_4^-$$ 2

(d) Predict the products of the following reactions.

(i) cis – 2 – Butene $\xrightarrow{Br_2}$ A + B

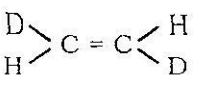
(ii) trans-2-Butene $\xrightarrow{Br_2}$ C + D 3

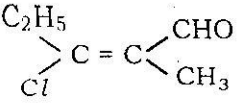
**9.** (a) Balance the following reactions by ion-electron method. 2×3

(i) $Zn + NaNO_3 + NaOH \rightarrow Na_2ZnO_2 + NH_3 + H_2O$

(ii) $K_2Cr_2O_7 + H_2SO_4 + KI \rightarrow Cr_2(SO_4)_3 + I_2 + K_2SO_4 + H_2O$

(b) Designate E/Z nomenclature of the following compounds : 2

(i) 

(ii) 

(c) Explain why the following reaction give anti Markownikoff product in the absence of peroxide.

$$CH_2 = CH - CF_3 + HCl \rightarrow ClCH_2CH_2CF_3 .$$ 2