INTER B.SC. EXAMINATION, 2018

(1st Semester)

CHEMISTRY (SUBSIDIARY)

PAPER - VIS

Time : Two hours Full Marks : 50

Use a separate answerscript for each group.

GROUP - A

1. a) How does nonvolatile impurity affect vapour pressure and boiling point of a liquid ? 4

   b) Liquid A (molecular mass 78) and liquid B (molecular mass 92) form an ideal solution. At 313 K, the vapour pressure of pure A and B are 160 mm of Hg and 60 mm of Hg respectively. Calculate (i) the vapour pressure of a solution containing equal masses of A and B and (ii) the composition of the vapour phase. 4

2. a) State Nernst distribution law.

   When varying amounts of iodine were shaken with CCl_4 – water mixture, the following concentrations of iodine (in g/100 cm^3) were obtained :

CCl_4 layer	5·1	10·2	15·2	20·3
Water layer	0·06	0·119	0·178	0·236

   Show that these results illustrate the Nernst distribution law. 2+2

b) What are the number of components, phases and degrees of freedom in following equilibrium ?

$CaCO_3\ (s) = CaO\ (s) + CO_2\ (g)$ 3

c) 'Dry ice sublimes, not melts at atmospheric pressure' - How can you explain the fact with the help of phase diagram ? 2

GROUP - C

7. a) Predict the structure of the following compounds :

i) B_2H_6

ii) BCl_3

iii) 12-crown-4

iv) XeO_4

v) XeF_4 $1+(\frac{1}{2})\times4$

b) Express the class of the following boron Hydrides : 3

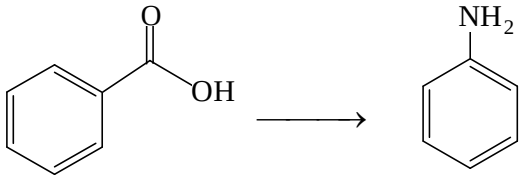
i) $[B_6H_6]^{2-}$ (ii) B_4H_{10} (iii) B_6H_{10}

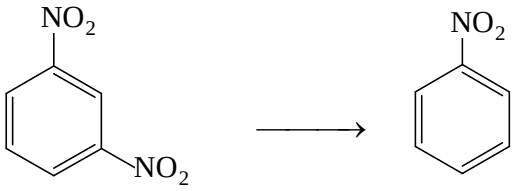
c) Write down short notes on :

i) Borazine (Synthesis, Structure and Reactivity)

ii) Basic Berrylium Acetate (Synthesis and Structure) 4+3

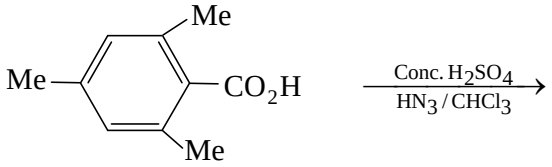
d) How would you separate K^+ and Cs^+ from their aqueous solution ? 3

ii) 

iii) 

6. Predict the product of the following reaction with plausible mechanism ***(any two)*** : 2×2

a) $(CH_3)_3C-OH \xrightarrow{H^{\oplus}/R-CN}$

b) 

c) 

GROUP - B

3. Answer ***any two*** of the following questions : $2\frac{1}{2}\times2$

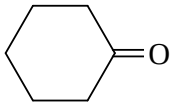
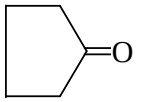
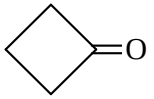
a) State Lambert-Beer's law and its limitations.

b) What is hypochromic shift ? Explain with a proper example.

c) What is auxochrome ? Explain it's working principle.

4. Answer ***any two*** of the following questions : 2×2

a) Compare the IR-band for the stretching vibrations of >C=0 in the following compounds

(i)  (ii)  (iii) 

b) State Hook's law and comment on the selection rule of IR-spectroscopy.

c) Explain the different modes of vibrations invovled in the molecule to respond in IR-Spectroscopy.

5. Carry out the following chemical transformation : 2×2

i)