Use separate answer script for each group

# UndergraduateExamination, 2018

**Semester-III (CBCS)**

**Chemistry**

**Generic Elective Course: GEC-3**

**Time: Three Hours** **Full Marks: 60**

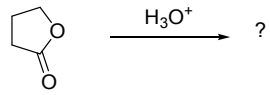
Questions are of value as indicated in the margin.

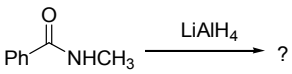
## Group-A (Marks: 30)
## ( Organic Chemistry )

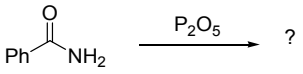
Answer***any three***questions.

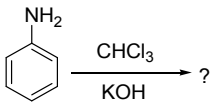
1. Predict the product(s) with the name of the following reactions (***any five***): 2x5

a) $CH_3CH_2COOH \xrightarrow{SeO_2}$ ?

b)  ?

c)  ?

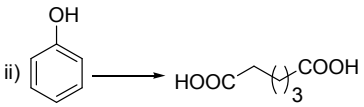
d)  ?

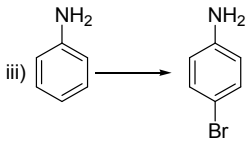
e)  ?

f) $2\ CH_3COCl \xrightarrow{(CH_3)_2Cd}$ ?

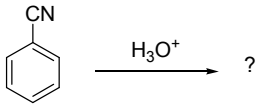
2. a) How will you make the following transformations? 2x3

i) $CH_3CH_2COOH \longrightarrow CH_3CH_2CH_2COOH$

ii) 

iii) 

b) Predict the product with suitable mechanism of the following reaction: 1+3



3. a) Write down the open chain as well as cyclic structure of D(+) glucose. What are the drawbacks of open chain structure of glucose and how the cyclic structure can explain these? 1+1+2+2

b) Convert D (+) Glucose to D(–) Fructose. 3

c) What are the products if we hydrolyse (+) sucrose? 1

4. a) Why the amino acids are highly polar? 2

b) Give the outline for synthesis of any α-amino acid by a method of your choice. 2

c) Write short notes on (***any two***): 3+3

(i) Primary structure of protein, (ii) Hydantoin synthesis, (iii) Sanger method.

## Group-B (Marks: 40)
## ( Organic Chemistry )

Answer***any four***questions.

1. a) Show that it is not possible to have more than three phases at equilibrium for a one-component system. 3

**P.T.O.**

b) How many degrees of freedom, number of phases and number of components are present in the following system:
liquid and its vapour in equilibrium with each other. 3

c) Illustrate with examples, the meaning of the terms enantiotropy and monotropy. 4

2. a) How many triple points are present in the phase diagram of water? Justify with reason. 2

b) Show how are the following systems represented in a one-component phase diagram:
i) system consisting of only one phase.
ii) system consisting of two phases in equilibrium. 2

c) Draw the phase diagram of two-component system exhibiting simple eutectic behaviour. 4

d) What are the main criteria for exhibiting positive deviations of non-ideal solution from ideality? 2

3. a) Derive the lever rule as applicable to the solid-liquid region of a simple eutectic phase diagram. 5

b) Write down Nernst equation for the electrode potential of $Zn/Zn^{2+}$ electrode. 1

c) Given, the standard reduction potential of $Zn/Zn^{2+}$ and $Cu/Cu^{2+}$ are –0.761 V and +0.337 V, respectively. Construct a cell with these two electrodes using salt-bridge. Write the electrode reactions and calculate the e.m.f. 2

d) Why is the liquid junction potential generated? Which salts are used to eliminate this potential and why? 2

4. a) On which factors the conductance of an electrolytic solution depends? 2

b) Define transport or transference number. 2

c) A $AgNO_3$ solution containing 0.00739 g of $AgNO_3$ per g of water is electrolysed between silver electrodes. During the experiment 0.078 g of Ag was deposited on the cathode. At the end of the experiment anode solution contained 23.11 g of $H_2O$ and 0.236 g of $AgNO_3$. What is the transport number of $Ag^+$? 3

d) Define specific conductance and equivalent conductance of electrolytic solution. Find a relation between them. 3

5. a) What is Kohlrausch's law of independent migration? Show one of its application? 2.5

b) Discuss how degree of dissociation of weak electrolytes can be determined from conductance measurement? 2

c) Draw a conductometric titration curve for acid-base titration of HCl vs NaOH. Explain the nature of the curve. 2

d) EMF of any electrochemical cell should be positive explain why? 1

e) For the following electrochemical cell

$$Zn \mid ZnSO_4^{\text{solution}} \parallel Hg_2SO_4 \mid Hg, E = 1.420\,V \quad \text{and} \quad \frac{dE}{dT} = -1.2 \times 10^{-3}\ V/^{\circ}C \text{ at } 25\,^{\circ}C.$$

Calculate $\Delta G$, $\Delta H$ and $\Delta S$ for the cell reaction. 2.5

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