Date: 07.10.2019 **Time : 3 Hours** **Total Marks : 100**

Please check whether you have got the right question paper.

N.B. : 1. All Questions are compulsory.

2. Figures to the right indicate full marks.

3. Use of log-table/nonprogrammable calculator is allowed.

4. Answers for the same question as far as possible should be written together.

1. (A) Select the correct option and complete the following sentences. (any **twelve**) **12**

(i) Nitration of phenol is a example of …… reaction
(a) Reversible (b) Consecutive (c) Parallel

(ii) Increase in reaction rate with temperature is due to …
(a) decrease in activation energy (b) increase in total number of collisions
(c) increasing in number of molecules having energy of activation

(iii) Which of the following will form an ideal solution?
(a) C_2H_5OH and H_2O (b) HNO_3 and H_2O (c) C_6H_6 and $C_6H_5CH_3$

(iv) The correct form of Arrhenius equation is
(a) $k=A\ e^{-Ea/RT}$ (b) $lnk=A\ e^{-Ea/RT}$ (c) $k=A\ e^{-Ea/RT2}$

(v) For the study of Nernst distribution law two liquids should be
(a) miscible (b) immiscible (c) volatile

(vi) The temperature at which two conjugate solutions forms homogeneous phase is called as
(a) critical solution temperature (b) critical temperature
(c) Daltons temperature

(vii) _____ is the electron deficient compound.
(a) B_2H_6 (b) $SiCl_4$ (c) SiO_2

(viii) The tendency of BF_3 , BCl_3 & BBr_3 to behave as lewis acid decreases in the sequence _____ .
(a) $BF_3 > BCl_3 > BBr_3$ (b) $BCl_3 > BF_3 > BBr_3$
(c) $BBr_3 > BCl_3 > BF_3$

(ix) _____ is incorrect statement as far as structure of diborane is concerned
(a) 'There are two bridging hydrogen atoms in diborane.'
(b) 'The hydrogen atoms are not in the same plane in diborane.'
(c) 'All B-H bonds in diborane are similar.'

(x) Non - Combustible hydride is _____ .
(a) NH_3 (b) PH_3 (c) AsH_3

(xi) _____ is not hydrolysed.
(a) $AsCl_3$ (b) PF_3 (c) NF_3

(xii) The least stable hydride of 15^{th} group elements is _____ .
(a) NH_3 (b) PH_3 (c) BiH_3

(xiii) The product of Friedel – Craft's acylation of arenes is _____.
(a) Alkylarene (b) aldehyde (c) ketone

(xiv) Aldehydes reacts with a secondary amine to give _____.
(a) enamine (b) imine (c) iminium salt

(xv) The product of Gatterman – Koch formylation is _____.
(a) aliphatic aldehyde (b) aromatic aldehyde (c) aromatic ketone

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(xvi) The decreasing order of reactivity of acetone, acetaldehyde and formaldehyde towards nucleophilic addition reaction is_____.
(a) acetone > acetaldehyde > formaldehyde
(b) acetaldehyde > formaldehyde > acetone
(c) formaldehyde > acetaldehyde > acetone

(xvii) _____ is not an active methylene compound.
(a) Ethyl acetate (b) Ethyl acetoacetate (c) Acetyl acetone

(xviii) _____ can exibit keto – enol tautomerism.
(a) Acetaldehyde (b) Benzaldehyde (c) Formaldehyde

(B) State whether the following statements are true or false. (any **three**) **3**
(i) Carbon atom of carbonyl group is SP^2 hybridised.
(ii) Reaction of Grignard regent with ketone gives tertiary alcohol.
(iii) B_2H_6 is a hydride of boron.
(iv) Borax is basic in nature.
(v) Chlorination of Toluene is an example of parellel reaction
(vi) Phenol water system is an example of lower consolute temperature

(C) Match the column. (any **five**) **5**

(i)	Consecutive reaction	(a)	Group 14 element
(ii)	Raults law	(b)	Oxidation
(iii)	Arsenic	(c)	Group 15 element
(iv)	Boron	(d)	$A \rightarrow B \rightarrow C$
(v)	Pyridiniun Chlorochromate (PCC)	(e)	Dehydrogenation
(vi)	Lithium Aluminium Hydride	(f)	Group 13 element
		(g)	$P^0 - P/P^0 = X_2$
		(h)	Reduction
		(i)	$P^0 - P/P = X_1$

2. Attempt any **four** of the following. **20**
(A) Explain with examples what is meant by i) reversible reactions ii) parellel reactions
(B) Derive Arrhenius equation to explain the effect of temperature on equilibrium constant
(C) What is energy of activation? the energy of activation of gaseous reaction is 50208 $Jmol^{-1}$ calculate the rate constant at 323 k if it is 4.0 x $10^{-3}s^{-1}$ at 303 k (R= 8.314 $JK^{-1}mol^{-1}$)
(D) What is an ideal solution ? state and explain Raults law
(E) Discuss the variation of mutual solubility with temperature for Phenol -Water system
(F) Define Nernst distribution law and state the condition under which law is strictly valid

3. Attempt any **four** of the following. **20**
(A) Draw the structure of BF_3. Why does it called Lewis acid ? Write its any three applications.
(B) What is borax? Explain any two methods used for its synthesis.
(C) Write a note on purification of germanium by any one method.
(D) What is atomic number of silicon ? What is its electronic configuration ? What is its position in the periodic table? Name any two compounds of silicon.
(E) Name and formulate any five oxides of nitrogen. Find oxidation state of nitrogen in each of them.
(F) With a suitable diagram, explain the synthesis of ammonia by Bosch – Haber process.

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4. Attempt any **four** of the following.

(A) What is Knoevenagel reaction ? Explain it's mechanism and give one example of it. **5**

(B) i) Give general mechanism of nucleophilic addition to carbonyl compound. **3**
ii) What is Rosenmund reduction ? Give one example of it. **2**

(C) i) Define enolisation. Give the mechanism of acid catalysed enolisation. **3**
ii) What is crossed Cannizzaro's reaction? Give an example of it. **2**

(D) i) How will you convert ethyl acetoacetate to succinic acid? **3**
ii) What are stabilised enols? Give one example of it. **2**

(E) Give chemical reactions for the following conversions. **5**
i)benzaldehyde to 1-Phenylethanol
ii) Benzene to acetophenone
iii) propyne to acetone.
iv) acetone to acetone sodium-bisulphite.
v) Benzaldehyde to Bezaldehyde cyanohydrin

(F) Explain the structure and reactivity of carbonyl group. **5**

5. Attempt any **four** of the following.

(A) Complete the following reaction, name it and write its mechanism **5**

$$2\ C_6H_5 - CHO + KCN \xrightarrow[C_2H_5OH,H_2O]{\Delta}$$

(B) How will you convert : **5**

1) Acetyl acetone to 2- Butanone
2) Ethyl formate to acetaldehyde

(C) Draw the structure of tetraborane. Explain various bonds involved in the structure. Calculate total number of electrons involved in the bonding. **5**

(D) What is silica ? Explain its structure and bonding. Why is it inert? **5**

(E) What are the different steps involved in H_2 and Br_2 chain reaction? **5**

(F) A solution of two liquids show ideal behaviour. The mole fraction of A is 0.4 The vapour pressure of pure A is 0.5 atm. and that of B is 0.3 atm.calculate partial vapour pressure of A and B in solution **5**

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