Q. P. Code: 30175

[Time : 3 Hours **[Total Marks : 100**

N.B. : 1. **All** questions are **compulsory**.

2. Answers to the same questions must be written together.

3. **Figures** to the right indicate full marks.

4. Use of non-programmable calculator /logarithm table is permitted

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

(i) Nitration of phenol is an example of _____ reaction.
(a) consecutive (b) parallel (c) reversible.

(ii) The reaction between $H_2 + Br_2 \rightarrow 2HBr$ is a chain reaction involving _____ as chain carriers.
(a) HBr molecules (b) H and Br atoms (c) H_2 and Br_2 molecules.

(iii) _____ is the mixture of an ideal solution.
(a) C_6H_6 and $C_6H_5CH_3$ (b) HNO_3 and H_2O
(c) $CHCl_3$ and CH_3COCH_3.

(iv) The _____ mixture of two or more components is termed solution.
(a) homogenious (b) heterogenious (c) binary.

(v) _____ oxide of nitrogen is an odd electron molecule.
(a) N_2O_4 (b) NO_2 (c) N_2O

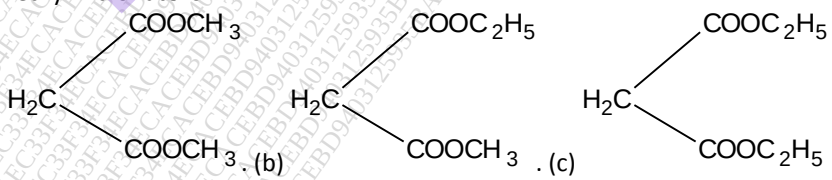
(vi) In SiO_2, central atom silicon undergoes _____ hybridisation.
(a) sp (b) sp^2 (c) sp^3

(vii) Except _____, all other elements of group 15 form trihalides.
(a) nitrogen (b) bismuth (c) arsenic

(viii) _____ the oxide of nitrogen does not act as a reducing agent.
(a) NO (b) NO_2 (c) N_2O_5

(ix) Benzoin condensation requires aromatic aldehyde having ---- .
(a) no alpha H atom (b) one alpha H atom
(c) two alpha H atom

(x) Dimethyl malonate is ---------- .



(a) . (b) . (c)

(xi) Enols of β – diketones are stabilised by _____
(a) Intramolecular H bond (b) solvation (c) van der Waals forces

(xii) Hybridization of Carbon in Carbonyl group is ---------- .
(a) sp (b) sp^2 (c) sp^3

(B) State whether the following statements are **true or false.** **3**

(i) Phenol-Water system is an example of lower critical solution temperature.

(ii) Ammonia is an electron deficient compound.

(iii) Aldehydes are usually more reactive towards nucleophilic reagents than ketone.

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

(i)	Unit of activation energy	(a)	CH_4
(ii)	Raoult's law	(b)	NH_3
(iii)	Lewis base	(c)	Electrophilic
(iv)	'C' in >C=O is	(d)	B_2H_6
(v)	Banana bond	(e)	$(p^0-p)/p^0 = x_2$
		(f)	kJ mol^{-1}
		(g)	kJ mol
		(h)	BH_3

2. (A) (i) Explain with suitable examples what is meant by consecutive reactions and parallel reactions. **5**

(ii) What are the merits of the collision theory of reaction rates? **3**

OR

(A) (i) Give an expression for the rate constant of a bimolecular reaction in terms of the activated complex theory. **5**

(ii) Explain the important steps in a chain reaction. **3**

(B) (i) What are partially miscible liquids? Explain the term " Lower critical solution temperature". **5**

(ii) Draw the vapour pressure-composition diagrams for the positive deviations from Raoult's law. **3**

OR

(B) (i) State the Nernst distribution law. State the conditions under which the law is strictly valid. **5**

(ii) Discuss the variation of mutual solubility with temperature for the phenol-water system. **3**

(C) If the rate of a reaction doubles from 20^0C to 30^0C, Calculate the energy of activation of the reaction. [$R = 8.314\ J\ K^{-1}\ mol^{-1}$]. **4**

OR

(C) 30 g of liquid 'A' and 60 g of liquid 'B' are mixed together to form an ideal solution. Calculate the total vapour pressure of an ideal solution. ($M_A = 56$, $M_B = 90$, $p^0_A = 266 \times 10^2\ N/m^2$, $p^0_B = 931 \times 10^2\ N/m^2$) **4**

3. (A) (i) What is meant by electron deficient compound? Rationalise the Lewis acidity of BF_3 and BCl_3. **4**

(ii) Explain the structure and bonding in diborane. **4**

OR

(A) (i) Write a note on synthesis of borax. **4**

(ii) What is tetraborane? How is it prepared? Find the number of 3c-2e bonds in tetraborane? **4**

(B) (i) Name the hydrides of nitrogen family. Compare their stabilities with reasoning. **4**

(ii) Nitrogen and bismuth do not form pentafluorides. Why ? **4**

OR

(B) (i) Name correctly: N_2O_4 and N_2O. Draw their structures. **4**

(ii) Write a note on the preparations of NO and NO_2. **4**

(C) How does germanium occur in nature? How is it extracted? **4**

OR

(C) With the help of a suitable diagram explain the refining of silicon by Czochralski pulling technique. **4**

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4.	(A)	(i)	(a) Explain the mechanism of Claisen-Schmidt reaction with a suitable example.	**3**
			(b) How will you obtain Benzaldehyde using Friedel Craft acylation.	**2**
		(ii)	Write note on Rosenmund reduction.	**3**
			OR	
	(A)	(i)	Write Knoevenagel reaction and explain its mechanism with suitable an example.	**5**
		(ii)	Give preparation of 2-butanone from acetyl acetone.	**3**
	(B)	(i)	a) Discuss the preparation of aldehydes and ketones by oxidation of alcohols by using PCC.	**3**
			b) Discuss the reduction of crotonaldehyde by using $LiAlH_4$.	**2**
		(ii)	Write a note on Gattermann Coach formylation.	**3**
			OR	
	(B)	(i)	How will you convert Ethyl aceto acetate into the following compounds? a) 2-pentanone , b) Succinic acid	**5**
		(ii)	Discuss the reduction of p- Nitro benzaldehyde by $NaBH_4$.	**3**
	(C)		What are imines and enamines? How are they obtained from aldehyde?	**4**
			OR	
	(C)		Explain the reaction of Benzaldehyde with : a) HCN, b) $NaHSO_3$, c) Phenyl hydrazine, d) 2,4-DNP	**4**

5.	Attempt any **four**		
	(A)	State the Lever rule. Explain the fractional distillation.	**5**
	(B)	The energy of activation for the dissociation of HI is 184.2 kJ mol^{-1}. The number of molecules colloiding per cubic centimetre per second is 6 X 10^{31} at 556K. Calculate the specific reaction rate at 556K. [R = 8.314 JK^{-1} mol^{-1}].	**5**
	(C)	Write note on synthesis of ammonia.	**5**
	(D)	What are the applications of BH_3 and BF_3.	**5**
	(E) (i)	Discuss the mechanism of Base catalysed enolisation.	**3**
	(ii)	Explain the general mechanism of Acid catalysed nucleophilic addition reaction.	**2**
	(F)	Write the IUPAC name of CH_3CHO. Give its preparation from suitable Grignard reagent. How will you obtain 2-butanol from CH_3CHO using suitable Grignard reagent?	**5**

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