



বিদ্যাসাগর বিশ্ববিদ্যালয়

**VIDYASAGAR UNIVERSITY**

**Question Paper**

**B.Sc. General Examination 2023**

**(Under CBCS Pattern)**

**Semester — II**

**Subject : CHEMISTRY**

**Paper : DSC-1BT/2BT/3BT**

**( Chemical Energetics, Equilibria and  
Functional Organic Chemistry )**

**Full Marks : 40**

**Time : 2 hours**

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

*The figures in the margin indicate full marks.*

Answer from **all** the Groups as directed.

**GROUP—A**

1. Answer **any five** questions from the following :

*Time to answer*  
**2×5=10**

(a) State Le Chatelier's principle.

( 2 )

(b) Calculate the pH of  $10^{-8}$ (M) NaOH solution.

(c) What is common ion effect?

(d) State the third law of thermodynamics.

(e)  $\text{CH}_3\text{CHO} \xrightarrow[\text{NaOH}]{\text{dilute}} \text{A} \xrightarrow{\text{Heat}} \text{B}$

(f)  $\text{RCOOH} \xrightarrow{\text{AgOH}} \text{C} \xrightarrow[\text{CCl}_4]{\text{Br}_2} \text{D}$

(g) Distinguish between  $\text{CH}_2 = \text{CH} - \text{Cl}$  and  $\text{CH}_2 = \text{CH} - \text{CH}_2\text{Cl}$ .

(h) Write a short note on 'Lucas Test'.

**GROUP—B**

2. Answer *any four* questions from the following :  $5 \times 4 = 20$

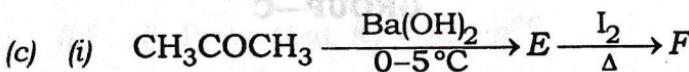
(a) (i) Discuss the physical significance of entropy. 3

(ii) What do you mean by the ionic product of  $\text{H}_2\text{O}$ ? 2

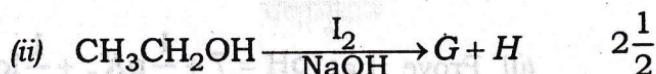
(b) (i) Discuss Friedel-Crafts alkylation and acylation reaction. 3

(ii) What do you mean by hydrolysis constant of salt? 2

( 3 )



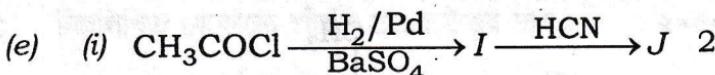
$2\frac{1}{2}$



$2\frac{1}{2}$

(d) (i) Derive Kirchhoff's equation. 3

(ii) Write a note on Buffer solution. 2



2

(ii) Write an example of benzoin condensation. 1

(iii) Write a short note on Wittig reaction. 2

(f) (i) What happens when bromobenzene is treated with sodamide in liquid  $\text{NH}_3$ ? Give mechanism. 3

(ii) Give an example of  $\text{S}_{\text{N}}\text{i}$  reaction. 2

( 4 )  
GROUP—C

Answer **any one** question from the following :

$10 \times 1 = 10$

3. (a) (i) What is the degree of ionization? 2

(ii) Prove that  $\text{pH} = 7 + \frac{1}{2} \text{p}K_a + \frac{1}{2} \log C$  3

(b) (i)  $\text{C}_6\text{H}_6 \xrightarrow[\text{AlCl}_3]{\substack{\text{CH}_3\text{COCl} \\ \text{Anhydrous}}} A \xrightarrow[\text{Con. HCl}]{\text{Zn-Hg}} B$  3

(ii) Convert : Cumene  $\rightarrow$  Phenol 2

4. (a) (i)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{ONa} + \text{CH}_3\text{Br} \xrightarrow{\Delta} \text{C} \\ | \\ \text{CH}_3 \end{array}$  1

(ii) Write a short note on pinacol-pinacolone rearrangement. 2

(iii)  $E \xleftarrow[\text{NaOH}]{\text{C}_6\text{H}_5\text{COCl}} \text{C}_6\text{H}_5\text{OH} \xrightarrow[\text{KOH}]{\text{CHCl}_3} D$  2

( 5 )

(b) (i) Prove that  $k_p = k_x \cdot p^{\Delta n}$  3

(ii) Explain all adiabatic processes are isoentropic processes. 2

### বঙ্গানুবাদ

পরীক্ষার্থীদের যথাসত্ত্ব নিজের ভাষায় উত্তর দেওয়া প্রয়োজন।

দক্ষিণ প্রান্তস্থ সংখ্যাগুলি প্রশ্নমান নির্দেশক।

নির্দেশানুসারে সকল বিভাগ থেকে উত্তর দাও।

### বিভাগ—ক

১. নিম্নলিখিত যেকোনো পাঁচটি প্রশ্নের উত্তর দাও:  $2 \times 5 = 10$

(ক) লা শাতেলিয়ারের নীতিটি লেখ।

(খ)  $10^{-8}$  (M) NaOH দ্রবণের pH গণনা কর।

(গ) সমআয়ন প্রভাব কী?

(ঘ) তাপগতিবিদ্যার তৃতীয় সূত্রটি লেখ।

