



বিদ্যাসাগর বিশ্ববিদ্যালয়

**VIDYASAGAR UNIVERSITY**

**B.Sc. Honours Examination 2021**

(CBCS)

**4th Semester**

**CHEMISTRY**

**PAPER—SEC2T & SEC2P**

*Full Marks : 40*

*Time : 2 Hours*

*The figures in the right-hand margin indicate full marks.*

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

**SEC2T : BASIC ANALYTICAL CHEMISTRY**

**THEORY : SEC2T**

Answer any *one* question.

1×15

1. (a) Define standard deviation (S.D.). A titration gives burette readings of 10, 7, 9, 2, 3, 12, 4, 13, 6 and 14 c.c. Calculate the standard deviation. 1+3
- (b) Give two examples of artificial sweeteners. 2

- (c) State the principle of paper chromatography. 2
- (d) Write down the ingredients present in
- (i) Face powder
  - (ii) Nail polish. 3
- (e) Comment on acid-base character of soil. 2
- (f) Round the following so that only significant digits are retained 2
- (i)  $\log (9.57 \times 10^4)$
  - (ii) antilog 12.5
- 2.** (a) State two sources of systematic error and two sources of random error in measuring width of a 3-m table with 1-m rule. 3
- (b) What is reversed-phase partition TLC? 2
- (c) How dissolved oxygen (DO) content in a given water sample is estimated? 2
- (d) What type of materials are present in a soil? 2
- (e) How do strong and weak-acid synthetic ion-exchange resins structurally differ? 2
- (f) Write down the type of foods that are preserved by sugar, salt, oil and vinegar. 3
- (g) Mention one application of ion-exchange method. 1
- 3.** (a) What are the different types of systematic errors? Which one is most difficult to identify and correct? 2+2
- (b) Find the mean and median of each of the following sets of data. Determine the deviation from the mean for each data point within the sets and find the mean deviation for each set

(i) 0.0110      0.0104      0.0105      4

(ii) 188      190      194      187

(c) State the differences between adsorption and partition chromatography.      3

(d) Calculate the mean and standard deviation of the following set of analytical results: 12.96, 13.05, 12.81 and 12.75.      4

Answer any *one* question.      1×10

4. (a) State the differences between Mean and Median.      2

(b) Define R<sub>f</sub> with respect to Thin Layer Chromatography (TLC)      2

(c) Why sodium fluoride is used in tooth paste?      2

(d) What is NPK? Describe formation of  $\text{HPO}_4^{2-}$  and  $\text{H}_2\text{PO}_4^-$  in soil.      3

(e) Why amylacetate is used in cosmetics?      1

5. (a) Indicate the order in which the following compounds would be eluted from a HPLC column containing a reversed-phase packing.      3

(i) benzene, diethyl ether, n-hexane

(ii) acetone, dichloroethane, acetamide

(b) What type of species can be separated by ion exchange chromatography?      2

(c) What are the functions of food preservatives?      2

(d) Distinguish between (i) accuracy and precision (ii) absolute and relative error.      3

**PRACTICAL : SEC2P**Answer any *one* question.

1×15

1. Describe the method of estimation of the total amount of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  ion present in the given sample (g/l).
2. Discuss the Paper chromatographic separation procedure of mixture of  $\text{Fe}^{3+}$  and  $\text{Al}^{3+}$  metal ions.
3. Discuss Winkler method for the estimation of dissolved oxygen (DO) of sea water.

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**SEC2T : CHEMISTRY OF COSMETICS AND PERFUMES****THEORY : SEC2T**Answer any *one* question.

1×15

1. (a) What is the ideal characteristics of good lipsticks? Write down the formulation of lipsticks. 3+2
- (b) Define cosmetics and give their uses. 1+2
- (c) Write down the characteristics of shampoo and briefly discuss the types of shampoo. 2+5
2. (a) What are the ideal properties of a nail enamel? 4
- (b) What is the film forming agent used in the formulation of nail enamel? 3

- (c) State the characteristics of powder. 3
- (d) What are the ingredients used for the preparation of compact powder? 5
3. (a) Discuss the types of surfactants used to prepare shampoo. 5
- (b) Classify creams and write down the properties of vanishing creams. 4
- (c) What are the commonly used colourants for lipsticks? 3
- (d) Write down the method of preparation of lipsticks. 3
- Answer any *one* question. 1×10
4. (a) State the various methods involved in the preparation of compact powder. 5
- (b) Briefly discuss the types of solvents are used in the preparation of nail enamel. 5
5. Write short notes on : 4×2.5
- (a) Sandalwood oil
- (b) Rose oil
- (c) Preservatives used in cosmetics
- (d) Semi-permanent Hair colorants.

**PRACTICAL : SEC2P**

Answer any *one* question. 1×15

1. (a) Write down the methods involved in the preparation of talcom powder.  
(b) Describe the general method for the preparation of shampoo. 2×7.5
  
2. (a) Write down the method for the preparation of lipsticks.  
(b) Describe the method for the preparation of nail polish remover. 2×7.5
  
3. (a) Write down the method for the preparation of face cream.  
(b) Describe the method for the preparation of nail enamel. 2×7.5

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**SEC2T : PESTICIDES CHEMISTRY**

Answer any *one* question. 1×15

1. Discuss the structure activity relationship of pesticides.
  
2. Write down the synthesis and discuss the uses of gammexene and chloranil. 2×7.5
  
3. Describe the synthesis and state the uses of carbofuran and butachlor. 2×7.5

Answer any *one* question. 1×10

4. What do you mean by natural pesticides and synthetic pesticides? What are the adverse effects of pesticides on the environment? 4+6
5. Describe the synthesis of DDT and state its uses. 6+4

### **PRACTICAL : SEC2P**

Answer any *one* question. 1×15

1. Describe the method of calculation of acidity / alkalinity in a given sample of pesticide as per BIS specifications.
2. Write the laboratory method of preparation of Malathion
3. Write the laboratory method of preparation of Parathion.

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### **SEC2T : FUEL CHEMISTRY**

Answer any *two* questions. 2×15

1. (a) What is coal gasification?  
(b) What are the important gases obtained from carbonization of coal? State the approximate composition of these gases from LTC.  
(c) The process of manufacture of water gas is not a continuous process- Explain.

- (d) What is meant by “reforming” in petroleum industry ?
- (e) Write an explanatory note on ‘Cloud Point’. 2+(2+3)+2+2+4
- 2.** (a) State the salient features of destructive distillation of coal.
- (b) State the principle of Bergius process for coal liquefaction. Describe briefly its applicability in India.
- (c) Liquid fuel having high octane number is suitable for use in diesel engine but not in petrol engine-Explain.
- (d) What is meant by LPG ?
- (e) Why are calorific values of coal gas (4900 kcal/m<sup>3</sup>) higher than that of producer gas (1300 kcal/m<sup>3</sup>) ? 2+(2+2)+4+2+3
- 3.** (a) What is meant by knocking ?
- (b) Distinguish between the following :
- (i) High temperature and low temperature carbonization of tar and gases
- (ii) High temperature and low temperature coke.
- (c) Why is catalytic cracking so important in processing of heavy petroleum fractions ?
- (d) Describe a process for the production of coal based liquid fuel.
- (e) What is ‘pour point’ of a lubricant ? 2+(3+3)+2+4+1
- 4.** (a) Critically describe a process for the cracking of high boiling petroleum residues mentioning the objectives of the cracking process.

- (b) Explain the terms “flash point” and “viscosity index”.
- (c) “It is preferable to use producer gas immediately after its production”  
— Why?
- (d) Write a short note on Proximate and Ultimate analysis of coal.  
(4+2)+(2+2)+2+3

Answer any *one* question.

1×10

- 5.** (a) What is biogas?
- (b) Why is Net calorific value (NCV) being less than Gross calorific value (GCV)?
- (c) Differentiate between HTC and LTC of coal.
- (d) Why natural gas needs purification? 2+2+4+2
- 6.** (a) What is solar energy?
- (b) How can you prepare isooctane?
- (c) State the composition of the following –  
(i) Coke oven gas, (ii) High temperature tar.
- (b) Define synthetic fuels with examples. 2+2+4+2