

POSTGRADUATE FORTH SEMESTER EXAMINATION, 2022

CHEMISTRY

Course Code: CHEM 403E

Course Id: 41453

Organic Chemistry Special

Time: 2 hours

Full Marks: 40

The figures in the margin indicate full marks

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

1. Answer *any five* of the following questions: 2×5 = 10

- a. What is ORD?
- b. How do epimers and anomers differ?
- c. Write down the structure of sucrose. Is it a reducing sugar?
- d. Show the product that results when β-D-glucose is treated with methanolic HCl.
- e. Why cis fatty acids have lower melting points than saturated fatty acids of same length.
- f. Why benzoyl protection cannot be used as end protecting group in peptide synthesis?
- g. Mention two distinct features of a peptide bond in a protein.

2. Answer *any four* of the following questions: 5×4 = 20

- a. State the basic difference between CD and VCD. Write the principal applications of VCD spectroscopy. 2+3 = 5
- b. i. Write down the structures of sugars obtained by epimerisation of C-2, C-3, C-4 of D-glucose, respectively.
- ii. Hydrolysis of (+) sucrose gives a mixture of D(+) glucose ($[\alpha]_D = 52.7^\circ$) and D(-) fructose ($[\alpha]_D = -92.4^\circ$) called invert sugar. Calculate the specific rotation of invert sugar. 3+2 = 5
- c. Starting from glucose how will you prepare (i) sorbitol, (ii) gluconic acid and (iii) fructose. What is mutarotation? Explain with a suitable example. 3+1+1 = 5
- d. Explain how phospholipid and cholesterol maintain the membrane fluidity. 5
- e. Write short notes on (i) vasopressin and (ii) secondary structure of protein. 2.5+2.5 = 5
- f. Furnish a schematic diagram that shows the mechanism of chymotrypsin action. 5

3. Answer *any one* of the following questions:

1×10 = 10

a. i. Glycoside neither reacts with Fehling's reagent nor mutarotate. Explain why?

ii. In addition to cleaving 1,2-diols, periodate also cleaves α -hydroxy aldehyde and ketone, α -diketone, α -hydroxy acid and β -amino alcohols. What products would be obtained by the periodic acid degradation of (a) D-galactose, (b) D-xylose and (c) D-fructose?

iii. Account for the observation that pyranosyl chloride exist almost exclusively as α -anomers.

iv. The Kiliani-Fischer homologation usually produces a predominance of one epimer. Mannose for example results in aldopentose anomers in the ratio of 96:4. Suggest an explanation for these results.

2+3+2+3 = 10

b. i. Write down the major components of plasma membrane. Why phospholipids and glycolipids readily form bimolecular sheets rather than a micelle in aqueous media. Explain.

ii. Mention a proper reagent used to cleave a disulphide bond and show the mechanism of cleavage using suitable example.

iii. Indicate two important advantages of Merrifield solid phase peptide synthesis.

(1+4)+(1+2)+2 = 10
