M.Sc. 4th Semester Examination, 2021

CHEMISTRY

(Organic Chemistry Special)

Paper : CHEM 403E

Course Id : 41453

Time: 2 hours **Full Marks: 40**

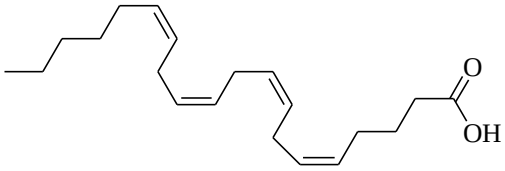
The figures in the margin indicate full marks

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 iodine number?

(b) There are two ways to count the position of double bond in a fatty acid, delta, and omega. Using both methods, classify arachidonic acid.



(c) State the basic differences between Vibrational Circular Dichroism (VCD) and Optical Rotation Dispersion (ORD).

(d) Write the structure of the C2 epimer of glucose.

(e) Name an instrument used in the determination of secondary structure of a protein.

(f) What are the advantages of solid phase peptide synthesis by fluorescamine method?

(g) Mention two advantages of automated oligo-nucleotide synthesis using phosphotriester approach.

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

(a) What is essential fatty acid? Give an example of omega-6 fatty acid. Between *cis* and *trans* fats which one is good for our health and why? 2+1+2 = 5

(b) The specific rotation of α-D-glucose is $+112^{o}$ and β-D-glucose is $+18.7^{o}$ where as the specific rotation of the constant equilibrium mixture is $+52.7^{o}$. Calculate the percentage

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composition of α and β anomers at equilibrium. How might conformational factors account for this result? 5

(c) (i) The bond between C1 and C2 in α-glucopyranose is oxidised by HIO_4 more rapidly than the β-isomer – explain.

(ii) Glucose, mannose and fructose give identical osazone – explain. 5

(d) (i) How will you distinguish 2-deoxyglucose from 3-deoxyglucose?

(ii) A monosaccharide is treated with HCN, the product hydrolysed and reduced to a carboxylic acid by heating with HI and P. What carboxylic acid is formed if the monosaccharide is (I) D-glucose (II) D-mannose (III) D-fructose? 5

(e) (i) Mention two demerits of phosphotriester method for the synthesis of gene.

(ii) What is the purpose of hydrogenation process of naturally occurring edible oil? Is it good or bad for our health? 2+(2+1) = 5

(f) Furnish a schematic diagram for the solid phase peptide synthesis by fluorescamine method. 5

3. Answer *any one* of the following questions: 1×10 = 10

(a) (i) Fluid mosaic model allows lateral movement but not rotation through the membrane-explain.

(ii) Which method is successfully applied in automated protein sequencing? Taking a suitable example, show the mechanism involved in this sequencing reaction. Mention the name of the intermediate and reagents involved. 3+(1+3+3) = 10

(b) (i) Write short notes on (A) vasopressin (B) haloketone rule and (C) sector rule.

(ii) Show why aldaric acid derived from ribose and xylose would not be optically active.

(3+3+3)+1 = 10

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