Enrolment No.: .....

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M. Sc. Chemistry, III Semester
End-term Examination 2023

Paper Name: Chemistry of Natural Products - I **Paper Code: MCHCCO-301**

Time: 3 hours **Maximum Marks: 75**

Note: This paper has 3 sections A, B, and C, Attempt all three sections; ***Section A:*** *Answer* ***all*** *the questions;* ***Section B****: Answer* ***any 2 out of 4****;* ***Section C:*** *Answer* ***all*** *the questions, each question has an* ***internal choice***

Abbreviations Used

CLO- Course Learning Outcome, PLO- Program learning Outcome, BTL- Bloom Taxonomy Level: BT level 1-Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create

Q.No		BTL	CLO	PLO
	SECTION A			
	Attempt ***all*** questions	**(10*2= 20 Marks)**		
A 1.	Name the phenolic compound present in tea?	1/2	1-3	1-3
A 2.	Draw the structure of a coumarin and show how the carbons are numbered.	1/2	1-3	1-3
A 3.	What is the basic unit in the biogenesis of true alkaloids?	1/2	1-3	1-3
A 4.	To which class of terpenoid does vitamin belong?	1/2	1-3	1-3
A 5.	Which alkaloid was isolated from opium as the first crude drug?	1/2	1-3	1-3
A 6.	In nature, nicotine only exists in the S form. Draw its structure	1/2	1-3	1-3
A 7.	What is the distinguishing feature of prostacyclin (PGI)	3/4	4-5	4-5
A 8.	C/D junction in steroids may be trans or cis. Give an example each of cis and trans C/D junction in steroids.	1/2	1-3	1-3
A 9.	What is steroidogenesis?	1/2	1-3	1-3
A 10.	Cholesterol and lithocholic acid are structurally related. Justify this statement.	3/4	4-5	4-5
	SECTION B			
	Attempt **any two** out of the following four questions	**(2*10=20 Marks)**		
B 1.	a. Explain how can the structure of different types of terpenoids be derived from isoprene units?	3/4	4-5	4-5
	b. How can you determine the number of double bonds and establish their position in Abietic acid?	5/6	6-7	6-7
B 2.	a. In aqueous solutions, anthocyanins exist in different forms that are maintained in equilibrium. Justify the statement.	3/4 5/6	4-5 6-7	4-5 6-7
	b. Can you synthesize α-Terpineol either from p-Toluic acid or by Perkin's method? How?			
B 3.	a. How can you apply Blanc's rule to determine the structure of the nucleus of cholesterol?	5/6	6-7	6-7
	b. Carbon skeleton and the structure of side chain in bile acids needs to be established in the structure elucidation of bile acids. How is it done?	5/6	6-7	6-7

B 4.	a. Distinguish between the structural features of non-heterocyclic and heterocyclic alkaloids with suitable examples. b. How can the mass fragmentation pathways in flavonoids and their glycosides help you establish their structure?	3/4	4-5	4-5

SECTION C

Attempt ***all*** questions, each question has an ***internal choice*** **(7x5=35 Marks)**

C 1.	Differentiate flavones from isoflavones by chemical and spectral methods?	3/4	4-5	4-5
	OR			
	Which methods do you think are suitable for the isolation of terpenoids? Give reasons for your analysis.	5	6-7	6-7
C 2.	What strategy will you adopt to determine the structure of quininic acid in quinine?	3/4	4-5	4-5
	OR			
	Propose a method of synthesis of progesterone either from cholesterol or diosgenin	5	6-7	6-7
C 3.	Apply your knowledge of the chemistry of alkaloids to propose an extraction/isolation method for alkaloids. Give two chemical tests for the detection of alkaloids.	5/2	6-7	6-7
	OR			
	Sketch the biosynthesis of nicotine showing the NAD pathway for nicotinic acid and the tropane pathway for N-methyl-Δ^1-pyrrollidium cation.	2/3	4-5	4-5
C 4.	Explain briefly with suitable examples the usage and application of the terminology "Nor", "Homo", "Cyclo" and "Abeo in the ring contraction and ring expansion of steroids.	1/2	1-3	1-3
	OR			
	UV shift reagents help in the structure elucidation of flavonoids. Justify how?	5/6	6-7	6-7
C 5.	How can you use ^{1}H NMR spectrum to determine the structure of quercetin?	3/4	4-5	4-5
	OR			
	How can you establish the presence of flavonoids using at least four chemical tests? How are these tests performed?	3	4-5	4-5
C 6.	Segregate steroids on the basis of their structures and their stereochemistry.	3/4	4-5	4-5
	OR			
	How are true alkaloids differentiated from proto-alkaloids and pseudo-alkaloids? Justify with suitable examples.	5/6	6-7	6-7
C 7.	I have come in possession of a brown liquid which, I am told is also a true alkaloid, help me identify it.	5/6	6-7	6-7
	OR			
	Segregate different classes of terpenoids on the basis of their structural forms.	3/4	4-5	4-5