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	ACADEMY OF HIGHER EDUCATION	j. No.									
DEPARTMENT OF SCIENCES, III SEMESTER M.Sc. (Chemistry)											
END SEMESTER EXAMINATIONS, APRIL/ MAY 2023											
(CHOICE BASED CREDIT SYSTEM - 2020)											
Time: 3 Hours Date: 02/05/2023 MAX. MARKS: 50											
Note: (i) Answer <b>ALL</b> questions.											
(ii) Draw diagrams, and write equations wherever necessary											
(iii) Given: Planck's constant ( $h$ ) = 6.626×10 <sup>-34</sup> Js; Avogadro number ( $N$ ) = 6.022×10 <sup>23</sup> mol <sup>-1</sup>											
Velocity of light (c) = $3 \times 10^8$ m/s											
Q. No.	Description							М	CO	В	L
1.A.	Compute the <sup>13</sup> C chemical shift ( $\delta$ ) values of all carbons of the 3-							5	1		3
	Pentanol (correction for internal OH substitution: $\alpha$ carbon = +41, $\beta$										
1 B	carbon = $+\delta$ , $\gamma$ carbon = $-5$ ) Explain the instrumentation of Mass spectrometry							5	3	-	2
1.0.	Explain the instrumentation of thuss speere	,interir y						0	5	-	_
2. A	Differentiate between ESR and NMR spectr	rosconi	c tec	hnia	mes	Dis	CUSS	5	2	~	2
	the applications of ESR spectroscopy				1		••••	U	-	-	-
2.B.	B. Discuss the reasons for Isomer shift ( $\delta$ ) of a Mössbauer nucleus and						and	5	2		3
	deduce the mathematical expression for it.										
3.A.	Discuss the theoretical ESR spectrum of *CH <sub>3</sub> radical with the possible						5	2		3	
	spin orientations and intensities of the spectral lines.										
3.B.	Discuss the factors affecting the <sup>13</sup> C NMR chemical shift values with							5	1	4	2
	appropriate examples.										
4 A	Explain the expected <sup>1</sup> H NMR and off-resonance <sup>13</sup> C spectra of $1.2.2$ -						5	1	2	3	
1.1 1.	trichloro propane.						0	1	•		
4.B.	Find the frequencies of absorption of the NQR spectrum of an axially						5	3	4	4	
	symmetric nucleus with $I = 9/2$ . The eigen	values	of th	e sy	sten	n are					
	$e^2 q Q 3m_l^2 - I$	I(I + 1)	1)								
$E_m = \frac{1}{4I(2I-1)}$											
<b>5</b> A								_	4		2
5.A.	Compound 'A' has the molecular formula $C_{10}H_{12}O_2$ . The mass spectrum of 'A' contains molecular ion peak at $m/c_1 = 164$ . It also have a base peak at							3	4	-	3
	m/e 119. The other prominent peaks are found at 136, 91 and 65. In its										
	<sup>1</sup> H NMR spectrum, the peaks appeared at $\delta$ 7.8 (doublet, peak area 2), 7.3										
	(doublet, peak area 2), 4.3 (quartet, peak ar	rea 2), 2	2.4 (	sing	let,	peak	area				
5 B	3) and 1.4 (triplet, peak area 3). Deduce the	structu	ure o	t'A	. ´. 	nuo	ميتوا	5	2	,	1
J. <b>U</b> .	<sup>119</sup> Sn when emitting a $\gamma$ -ray of frequency 5.	$76 \times 10^{13}$	$^{8}$ Hz.	7330	auci	nuc	icus,	5	4	-	r