Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Science

End Sem (Even) Examination May-2022

FS3EL08 Advance Instrumentation

Programme: B.Sc. (FS) Branch/Specialisation: Forensic Science

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. If the arrows hit the target in many locations- top, bottom, centre, left, and right of the centre- the archer is____. **1**

(a) Precise but not accurate
(b) Neither accurate and nor precise
(c) Precise
(d) Accurate

ii. The accepted value is 29.35. Which correctly describes this student's experimental data? Trial 1: measurement 29.48; Trial 2: measurement 28.97; Trial 3 measurement 29.27- **1**

(a) Accurate but not precise (b) Precise but not accurate
(c) Both accurate and precise (d) Neither accurate nor precise

iii. In chromatogram, the area under the peak can be used to determine which of the following? **1**

(a) Components of the sample
(b) Amount of component in the sample
(c) Column efficiency
(d) Column resolution

iv. In older analytical methods, which of the following methods were used to allow movement of the mobile phase? **1**

(a) Pumps (b) Pressure
(c) Gravity (d) Blowing air into the column

v. ECD detector in GLC is most suitable for the detection of- **1**

(a) Gasoline (b) Insecticide
(c) Metallic poison (d) None of these

P.T.O.

vi. The presence of kerosene in gasoline can be determined by- **1**
I. HPLC II. TLC III. GLC IV. GCMS
code
(a) I and II (b) II and III
(c) III and IV (d) I and IV

vii. Following factors determine band broadening except- **1**
(a) Eddy diffusion
(b) Longitudinal diffusion
(c) Mass transfer
(d) Composition of mobile phase

viii. Separation efficiency of the column can be controlled by following except- **1**
(a) Number of theoretical plates
(b) Liquid phase loading
(c) Length of the column
(d) Velocity of mobile phase

ix. Assertion (A): the volatile compound can be analysed by GLC **1**
Reason (R): because volatile compounds gets precipitated with inert gas in the column.
(a) Both (A) and (R) are correct.
(b) Both (A) and (R) are correct but (R) is not correct explanation of (A)
(c) (A) is true but (R) is false
(d) (A) is false but (R) is true

x. Arrange in proper sequence- **1**
I. Reverse phase chromatography
II. Partition chromatography
III. Adsorption chromatography
IV. Gas chromatography
(a) III, II, IV and I are correct
(b) II, I, IV and III are correct
(c) I, II, IV and III are correct
(d) III, II, I and IV are correct

Q.2 i. Define analytical chemistry. **2**
ii. What do you mean by "characterization" term? **3**

iii. Explain analytical approach. **5**
OR iv. Write short note on **5**
(a) Signal (b) Noise

Q.3 i. What is chromatography? **2**
ii. How MS Tswett proved that chlorophyll is not a single molecular entity discuss in detail? **8**
OR iii. Explain classification of chromatography. **8**

Q.4 i. What is resolution? **3**
ii. Discuss major causes of band broadening. **7**
OR iii. Explain plate theory of chromatography. **7**

Q.5 i. Discuss forensic scope of gas chromatography. **4**
ii. What is GC? Discuss its instrumentation. **6**
OR iii. Discuss principle and application of GC detectors. **6**

Q.6 Write short note on any two:
i. Detectors in HPLC **5**
ii. Forensic application of HPLC **5**
iii. Limitations of HPLC **5**

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Marking Scheme
FS3EL08 Advance Instrumentation

Q.1	i.	If the arrows hit the target in many locations- top, bottom, centre, left, and right of the centre- the archer is____. (b) Neither accurate and nor precise	**1**
	ii.	The accepted value is 29.35. Which correctly describes this student's experimental data? Trial 1: measurement 29.48; Trial 2: measurement 28.97; Trial 3 measurement 29.27- (c) Both accurate and precise	**1**
	iii.	In chromatogram, the area under the peak can be used to determine which of the following? (b) Amount of component in the sample	**1**
	iv.	In older analytical methods, which of the following methods were used to allow movement of the mobile phase? (c) Gravity	**1**
	v.	ECD detector in GLC is most suitable for the detection of- (b) Insecticide	**1**
	vi.	The presence of kerosene in gasoline can be determined by- I. HPLC II. TLC III. GLC IV. GCMS code (c) III and IV	**1**
	vii.	Following factors determine band broadening except- (d) Composition of mobile phase	**1**
	viii.	Separation efficiency of the column can be controlled by following except- (b) Liquid phase loading	**1**
	ix.	Assertion (A): the volatile compound can be analysed by GLC Reason (R): because volatile compounds gets precipitated with inert gas in the column. (c) (A) is true but (R) is false	**1**
	x.	Arrange in proper sequence- I. Reverse phase chromatography II. Partition chromatography III. Adsorption chromatography IV. Gas chromatography (a) III, II, IV and I are correct	**1**

Q.2	i.	Definition of analytical chemistry		**2**
	ii.	Definition	1 mark	**3**
		Different meaning of characterization	2 marks	
	iii.	Definition	1 mark	**5**
		Need of analytical approach	1 mark	
		Process	3 marks	
OR	iv.	(a) Signal with diagram	2.5 marks	**5**
		(b) Noise with diagram	2.5 marks	
Q.3	i.	Definition of chromatography		**2**
	ii.	Principle	4 marks	**8**
		Experiment	2 marks	
		Diagram	2 marks	
OR	iii.	Principle	4 marks	**8**
		Mobile phase	2 marks	
		Accommodation of stationary phase	2 marks	
Q.4	i.	Definition	1 mark	**3**
		Formula	2 marks	
	ii.	Introduction of band broadening	1 mark	**7**
		Types	2 marks	
		Explanation with Diagram	4 marks	
OR	iii.	Introduction and history	2 marks	**7**
		Theory	2 marks	
		Diagram	3 marks	
Q.5	i.	Introduction	1 mark	**4**
		Forensic scope	3 marks	
	ii.	Definition	1 mark	**6**
		Type	1 mark	
		Instrumentation	2 marks	
		Diagram	2 marks	
OR	iii.	Introduction	2 marks	**6**
		Principle and application of GC detectors	4 marks	
Q.6		Write short note on any two:		

i.	Introduction of HPLC	1 mark	**5**
	Type of detector	1 mark	
	Principle	1 mark	
	Application	2 marks	
ii.	Forensic application of HPLC		**5**
	Introduction	1 mark	
	Type of application	1 mark	
	Application	3 marks	
iii.	Limitations of HPLC		**5**
	Introduction	1 mark	
	Advantages of HPLC	1 mark	
	Limitation of HPLC	3 marks	

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