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

Enrollment No.....

Faculty of Science

End Sem Examination Dec-2023

FS3CO06 Technological Methods in Forensic Science

Programme: B.Sc. (Hons.) 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. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. Which of the following cannot be used as an adsorbent in Column adsorption chromatography? **1**

(a) Magnesium oxide (b) Silica gel

(c) Activated alumina (d) Potassium permanganate

ii. In which of the following methods are liquid samples injected into the column in gas chromatography? **1**

(a) Gas tight syringe (b) Micro-syringe

(c) Rotary sample valve (d) Solid injection syringes

iii. What is the unit of absorbance which can be derived from Beer Lambert's law? **1**

(a) L mol-1 cm-1 (b) L gm-1 cm-1

(c) Cm (d) No unit

iv. Which type of Quantum Transition takes place in Ultra-Violet and Visible spectroscopy? **1**

(a) Rotation of molecules

(b) Nuclear

(c) Bonding electrons

(d) Spin of nuclei in a magnetic field

v. In Michelson's interferometer, the _____ of the detector output will depend upon the intensity of incoming radiation. **1**

(a) Velocity (b) Frequency

(c) Amplitude (d) Phase

P.T.O.

vi. In Flame emission photometers, the measurement of _____ is used for qualitative analysis. **1**
(a) Colour (b) Intensity (c) Velocity (d) Frequency

vii. Which of the following component of TEM focuses the beam of electrons on the sample? **1**
(a) Ocular lens (b) Condenser lens
(c) Stage (d) Column

viii. Excitation filter is used in- **1**
(a) Polarizing microscope
(b) Fluorescent microscope
(c) Scanning Electron Microscope
(d) Transmission Electron microscope

ix. What is use of density gradient centrifugation? **1**
(a) To purify viruses, ribosomes, membranes
(b) To remove dirt
(c) To remove fine particles
(d) To remove large particles

x. What is other name for zonal centrifugation? **1**
(a) Isopynic centrifugation
(b) Gradient centrifugation
(c) Density gradient centrifugation
(d) Differential centrifugation

Q.2 i. Give the principle of chromatography and name few types of chromatographic techniques. **2**
ii. How tlc plate is prepared and activated for analysis. **3**
iii. Write in detail about photo multipliers detector with a diagram. **5**
OR iv. Define chromatography, its category with their forensic applications. **5**

Q.3 i. Draw the electromagnetic radiation spectrum on increasing frequency. **2**
ii. Write in detail about uv-visible spectroscopy, its principle, flowchart and instrumentation with forensic applications. **8**
OR iii. Write in detail about Flame atomic spectroscopy, its principle, flowchart and instrumentation with forensic applications. **8**

Q.4 i. Elaborate how can IR spectra components can be calculated or read. **3**
ii. Write in detail about Raman spectroscopy, its principle, flowchart, and instrumentation with forensic applications. **7**
OR iii. Elaborate Fourier transform IR spectroscopy, its principle, flowchart, and instrumentation with forensic applications. **7**

Q.5 i. Differentiate between SEM microscope and TEM microscope. **4**
ii. Define immune electrophoresis with forensic application. **6**
OR iii. Draw scanning electron microscopy with principle, its instrumentation and forensic application. **6**

Q.6 Attempt any two:
i. Give principle of sedimentation and analytical centrifugation. **5**
ii. Write in detail about density gradient centrifugation technique. **5**
iii. Differentiate between preparative centrifuge and ultra centrifuge. **5**

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Marking Scheme
Technological Methods in Forensic science (T)-
FS3CO06 (T)

Q.1	i)	(d) Potassium permanganate		**1**
	ii)	(b) Micro-syringe		**1**
	iii)	(d) No unit		**1**
	iv)	(c) Bonding electrons		**1**
	v)	(c) Amplitude		**1**
	vi)	(a) Colour		**1**
	vii)	(b) condenser lens		**1**
	viii)	(b) Fluorescent microscope		**1**
	ix)	(a) To purify viruses, ribosomes, membranes		**1**
	x)	(b) Gradient centrifugation		**1**
Q.2	i.	Give the principle of chromatography	1 mark	**2**
		few types of chromatographic techniques.	1 mark	
	ii.	Procedure of tlc plate preparation-	2 marks	**3**
		Activation of tlc plate-	1 mark	
	iii.	Photo multipliers detector-	3 marks	**5**
		with a diagram	2 marks	
OR	iv.	Define chromatography-	2 marks	**5**
		its category-	1 mark	
		Forensic applications-	2 marks	
Q.3	i.	Chart of ……..frequency-	2 marks	**2**
	ii.	about uv-visible spectroscopy	1 mark	**8**
		its principle-	2 marks	
		flowchart-	1 marks	
		instrumentation-	2 marks	
		forensic applications-	2 marks	
OR	iii.	Detail about Flame atomic spectroscopy-	1 mark	**8**
		its principle-	2 marks	
		flowchart-	1 marks	
		instrumentation-	2 marks	
		forensic applications-	2 marks	
Q.4	i.	Fingerprint region study	1.5 marks	**3**
		Structural group region study	1.5 marks	
	ii.	Raman spectroscopy its principle-	2 marks	**7**
		flowchart-	1 marks	
		instrumentation-	2 marks	
		forensic applications-	2 marks	
OR	iii.	FTIR its principle-	2 marks	**7**
		flowchart-	1 marks	
		instrumentation-	2 marks	
		forensic applications-	2 marks	
Q.5	i.	Differentiate	(1 Mark*4)	**4**
	ii.	Define immune electrophoresis	4 marks	**6**
		Forensic application.	2 marks	
OR	iii.	Diagram of Scanning electron microscopy	2 marks	**6**
		instrumentation-	2 marks	
		forensic applications-	2 marks	
Q.6				
	i.	Give principle of sedimentation	(2.5 marks)	**5**
		and analytical centrifugation	(2.5 marks)	
	ii.	Gradient centrifugation technique	(As per explantion)	**5**
	iii.	Differentiate (any five differences)	(1 Mark*5).	**5**

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