

Q.6

Attempt any two:

- i. Describe the basic types of fibers commonly encountered in forensic analysis. **5** 1 1 5
- ii. How is fiber comparison conducted in forensic science? Discuss the importance of comparing dye and its ingredients in fiber matching. **5** 2 2 5
- iii. Explain the concept of physical fit in forensic fiber analysis. How does it aid in linking fiber evidence to a possible source? **5** 3 2 5

\*\*\*\*\*

*Total No. of Questions: 6**Total No. of Printed Pages: 4***Enrolment No.....**

Faculty of Science

End Sem Examination Dec 2024

FS3EL01 Forensic Physics

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.

Marks	BL	PO	CO	PSO
-------	----	----	----	-----

- Q.1 i. In which part of the electromagnetic spectrum does visible light fall? **1** 1 1 1
- (a) Between infrared and ultraviolet
  - (b) Between microwaves and radio waves
  - (c) Between X-rays and gamma rays
  - (d) Between infrared and radio waves
- ii. What type of evidence is analyzed using the laws of motion in forensic physics? **1** 2 1 1
- (a) Blood type matching
  - (b) DNA profiling
  - (c) Accident reconstruction
  - (d) Toxicology reports
- iii. If a glass fragment is found to have a refractive index different from glass at the crime scene, what can be concluded? **1** 2 2 2
- (a) The fragment is likely from a different source
  - (b) The fragment is from the same source
  - (c) The fragment is older
  - (d) The fragment is contaminated
- iv. What forensic concept is applied to determine the side of impact by analyzing glass fractures? **1** 2 2 2
- (a) Newton's Laws of Motion
  - (b) 3R Rule
  - (c) First law of thermodynamics
  - (d) Law of gravity

[2]

- v. Which property of soil can be determined by examining soil under polarized light microscopy? **1**    1    1    3  
 (a) Organic content      (b) Mineral composition  
 (c) Color                  (d) Moisture content
- vi. What can the presence of foreign particles in soil, such as paint chips or metal fragments, indicate in a forensic investigation? **1**    1    1    3  
 (a) The soil is from a natural forest  
 (b) The soil sample might be contaminated from an urban or industrial environment  
 (c) The soil has a high pH level  
 (d) The soil is very dense
- vii. Which property of cement is often analyzed to link samples to a specific source? **1**    1    1    4  
 (a) Color  
 (b) Chemical composition  
 (c) Texture  
 (d) Shape of cement grains
- viii. Forensic analysis of spray paint graffiti can be used to- **1**    2    1    4  
 (a) Determine the pH level of the paint  
 (b) Measure the gloss level of the paint  
 (c) Examine the thickness of paint layers  
 (d) Identify the chemical composition and possible brand of paint
- ix. What is the best method for preserving fiber evidence collected from a crime scene? **1**    1    1    5  
 (a) Storing in a plastic bag  
 (b) Placing in an airtight container  
 (c) Folding it in paper or placing it in a small container  
 (d) Exposing it to sunlight to dry
- x. Which property can help differentiate cotton fibers from synthetic fibers? **1**    1    1    5  
 (a) Elasticity              (b) Refractive index  
 (c) Burn test results       (d) Size and shape

- Q.2 i. What is birefringence, and how does it relate to crystalline materials? **2**    2    1    1

[3]

- ii. Briefly describe the role of forensic physics in criminal investigations. **3**    2    2    1
- iii. Discuss the main instruments used in forensic physics and explain how each is applied in forensic investigations. **5**    3    2    1
- OR iv. Explain the role of microscopy and spectroscopy in forensic physics and how each contributes to the analysis of physical evidence. **5**    3    2    1
- Q.3 i. Explain the term ‘backward fragmentation’ in the context of glass fractures. **2**    2    2    2
- ii. Explain in detail the types of fractures seen in glass and their forensic significance. How do these fracture patterns help determine the direction and origin of force applied to the glass? **8**    2    1    2
- OR iii. Describe the different types of glass commonly found at crime scenes and their compositions. Include at least three types of glass and the role of each in forensic investigations. **8**    3    1    2
- Q.4 i. Explain the purpose of elemental analysis in soil forensics. **3**    1    1    3
- ii. Describe the procedure and forensic significance of density gradient analysis in soil examination. **7**    2    1    3
- OR iii. Outline the steps involved in soil sample preparation for forensic analysis. Explain why each step is crucial for reliable results. **7**    3    1    3
- Q.5 i. What are the basic physical and chemical methods used in the forensic analysis of cement? **4**    2    2    4
- ii. Discuss the different types of cement used in construction and how forensic scientists analyze cement to identify its composition and potential adulteration. **6**    2    2    4
- OR iii. Describe the techniques used in the microscopic and micro-chemical analysis of paint in forensic science. How do these analyses help in distinguishing between different paint samples? **6**    3    1    4

**Marking Scheme**  
**FS3EL01 (T) Forensic Physics (T)**

<b>Marking Scheme</b>		
<b>FS3EL01 (T) Forensic Physics (T)</b>		
Q.1	i) a. Between infrared and ultraviolet ii) c. Accident reconstruction iii) a. The fragment is likely from a different source iv) b. 3R Rule v) b. Mineral composition vi) b. The soil sample might be contaminated from an urban or industrial environment vii) b. Chemical composition viii) d. Identify the chemical composition and possible brand of paint ix) c. Folding it in paper or placing it in a small container x) c. Burn test results	1 1 1 1 1 1 1 1 1 1
Q.2	i. Definition <b>1M</b> Relation with the crystalline material <b>1M</b> ii. Description of role of forensic physics in criminal investigations <b>3 points- 1x3 mark</b> iii. At least 5 instruments ( <b>each will carry 1 mark</b> )	2 3 5
OR	iv. Role of microscopy ( <b>2.5M</b> ) Role of spectroscopy ( <b>2.5M</b> )	5
Q.3	i. Definition <b>2mark</b> ii. Types of fractures- <b>4 mark</b> Forensic significance- <b>4 mark</b> OR iii. Types of glass and composition- <b>6 mark</b> Role- <b>2 mark</b>	2 8 8
Q.4	i. purpose of elemental analysis in soil forensics <b>3 points- 1x3 mark</b> procedure <b>3M</b> and forensic significance of density gradient analysis in soil examination <b>4M</b> OR iii. Soil sample preparation steps <b>4M</b> Importance of each step <b>3M</b>	3 7 7
	Q.5 i. Physical methods of cement analysis <b>2M</b> And chemical methods of cement analysis <b>2M</b> ii. Types of cement <b>3M</b> Process to know composition and adulteration <b>3M</b> OR iii. Microscopic <b>3M</b> Micro-chemical analysis <b>3M</b>	4 6 6
	Q.6 i. Types of fiber <b>5 points -1x5 marks</b> ii. fiber comparison importance of comparing dye and its ingredients in fiber matching iii. concept of physical fit <b>2.5M</b> aid in linking fiber evidence to a possible source <b>2.5M</b>	5 5 5
	*****	