Total No. of Questions: 22

Enrollment No : _____

MEDICAPS UNIVERSITY

Faculty of Science

End Semester Examination May 2025

FS3EL07 Forensic Serology

Programme	:	B. Sc. (Hons.)	**Branch/Specialisation**	:	FS
Duration	:	3 hours	**Maximum Marks**	:	60

Note: *All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.*

Section 1 (Answer all question(s))

Marks CO BL

Q1. What is the primary role of forensic serology **1 1 2**

Rubric	Marks
DNA sequencing	1

- (•) DNA sequencing
- ( ) Evidence recognition and preservation
- ( ) Crime scene photography
- ( ) Fingerprint analysis

Q2. Which of the following is not a step in forensic serology **1 2 2**

Rubric	Marks
Digital encryption	1

- ( ) Collection of evidence
- ( ) Preservation of serological exhibit
- ( ) Forwarding evidence to lab
- (•) Digital encryption

Q3. The structure of antibodies is **1 1 1**

Rubric	Marks
Protein with a Y-shaped structure	1

- ( ) Single-stranded DNA
- (•) Protein with a Y-shaped structure
- ( ) Lipid membrane
- ( ) Carbohydrate chain

Q4. Which term describes the binding strength between an antigen and antibody **1 1 1**

Rubric	Marks
Immunogenicity	1

- ( ) Affinity
- ( ) Specificity
- ( ) Antigenicity
- (•) Immunogenicity

Q5. Which blood group system is most commonly used in forensic serology **1 2 2**

Rubric	Marks
ABO system	1

- ( ) MNS system
- (•) ABO system
- ( ) Rh system
- ( ) P system

Q6. The Rh blood group system is important because **1 1 1**

Rubric	Marks
It influences blood compatibility in transfusions	1

- (●) It influences blood compatibility in transfusions
- ( ) It determines blood clotting ability
- ( ) It detects bacterial infections
- ( ) It affects blood sugar levels

Q7. Centrifugation in forensic serology is used to **1 1 2**

Rubric	Marks
Separate blood components	1

- (●) Separate blood components
- ( ) Amplify DNA
- ( ) Detect bacterial pathogens
- ( ) Analyze hair fibers

Q8. Electrophoresis is used to **1 2 1**

Rubric	Marks
Separate proteins based on size and charge	1

- ( ) Separate DNA fragments
- (●) Separate proteins based on size and charge
- ( ) Detect blood group antigens
- ( ) Amplify genetic material

Q9. Capillary electrophoresis is characterized by **1 2 2**

Rubric	Marks
Separation in a gel matrix	1

- ( ) Separation in a thin capillary tube
- (●) Separation in a gel matrix
- ( ) Use of magnetic fields
- ( ) Use of radioactive labels

Q10. What is the principle behind electrophoresis **1 3 1**

Rubric	Marks
Movement of charged molecules in an electric field	1

- (●) Movement of charged molecules in an electric field
- ( ) Separation based on magnetic properties
- ( ) DNA hybridization
- ( ) Protein digestion

Section 2 (Answer any 2 question(s))

Marks CO BL

Q11. Discuss the role of serological techniques in linking evidence to suspects and victims. **5 3 2**

Rubric	Marks
Five examples with explanation (5 marks)	5

Q12. Describe the significance of serology in establishing blood type and other biological markers. **5 2 1**

Rubric	Marks
Five points on the significance of serology in establishing blood type and other biological markers.	5

Q13. Explain the process of collecting and preserving serological evidence from a crime scene. **5 2 3**

Rubric	Marks
Collection & preservation methods of serological samples.	5

Section 3 (Answer all question(s)) **Marks CO BL**

Q14. What is the role of adjuvants in immune response? **2 1 1**

Rubric	Marks
Two roles of adjuvants in immune response	2

Q15. (a) Discuss the structure and function of antibodies and their role in forensic investigations **8 2 1**

Rubric	Marks
structure and function of antibodies 4 marks and a role in forensic investigations (4 marks)	8

(OR)

(b) Discuss the serological techniques of antigen-antibody reactions and also explain their forensic application.

Rubric	Marks
Precipitation Agglutination Complement dependent test immunofluorescence (2 marks each) process and application	8

Section 4 (Answer all question(s)) **Marks CO BL**

Q16. Explain the significance of Rh blood group in forensic investigations. **3 2 2**

Rubric	Marks
significance of Rh blood group in forensic investigations	3

Q17. (a) Discuss polymorphic enzymes such as PGM and ESD. Also explain their forensic application. **7 2 3**

Rubric	Marks
PGM & ESD- process and forensic application	7

(OR)

(b) Elaborate the ABO blood grouping method Absorption-inhibition method and absorption-elution method from bloodstain.

Rubric	Marks
Absorption-inhibition method 3.5 Marks Absorption-elution method 3.5 Marks (Process + Application	7

Section 5 (Answer all question(s)) **Marks CO BL**

Q18. Discuss ELISA. How is it used in forensic serology? **5 1 2**

Rubric	Marks
Process of ELISA and forensic importance. 5 MARKS	5

Q19. (a) Explain the different types of agglutination-based assays used in forensic science. **5 2 1**

Rubric	Marks
Direct agglutination- 1.5 marks, Passive agglutination- 1.5 marks, & agglutination inhibition methods—2 marks	5

(OR)

(b) Write a note on immunochromatographic assay.

Rubric	Marks
Process and application- 5 Marks	5

Section 6 (Answer any 2 question(s))

Marks CO BL

Q20. Give the difference between vertical and horizontal electrophoresis. **5 3 2**

Rubric	Marks
5 points earch- 5 marks	5

Q21. Discuss electrophoresis techniques and their types with their forensic applications. **5 3 1**

Rubric	Marks
electrophoresis techniques- 2 marks types- 2 marks application- 1 marks	5

Q22. Give a detailed note on PAGE electrophoresis with their forensic application. **5 3 2**

Rubric	Marks
process/principle 3 marks application- 2 marks	5

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