C–6774	Sub. Code 99042

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fourth Semester

Forensic Science

INSTRUMENTATION BIO-CHEMICAL

(2020 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is the purpose of a stock solution in laboratory work?

2. Define centrifugation.

3. Differentiate between a simple microscope and a compound microscope.

4. Explain the function of lens systems in microscopy.

5. What is the primary principle behind a polarized light microscope?

6. What does AFM stands for?

7. Define chromatography.

8. What is the principle behind the separation of components in paper chromatography?

9. What is electrophoresis?

10. Expand SDS-PAGE.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b)

11. (a) Explain the principles of pH and buffers in biochemical analysis. Discuss how a pH meter functions.

Or

(b) Define centrifugation. Discuss the basic principles of centrifugation and the concept of Svedberg's unit.

12. (a) Describe the working principle of a comparison microscope. How is it used to compare two specimens in forensic analysis?

Or

(b) Explain the working of a lens system in a microscope.

13. (a) Describe the principle and working mechanism of a Scanning Electron Microscope (SEM).

Or

(b) Explain the principle of a Polarized Light Microscope and their applications in forensic science?

14. (a) Define gas chromatography (GC).Explain the principle of separation in GC.

Or

(b) Write a note on HPLC

15. (a) What is precipitin reaction? Explain the mechanism of the precipitin reaction and its significance in immuno-chemical techniques.

Or

(b) Describe the general principles underlying antigen and antibody interactions in immunochemistry, highlighting their roles in the immune response.

Part C (3 × 10 = 30)

Answer **all** questions, choosing either (a) or (b)

16. (a) Write a short note on different types of microscope.

Or

(b) Compare and contrast Thin Layer Chromatography (TLC) and High Performance Thin Layer Chromatography (HPTLC).

17. (a) Describe the basic principles of centrifugation and discuss the types of centrifuges.

Or

(b) Explain the principle, Parts and working of compound microscope.

18. (a) Explain the general principle of electrophoresis and the factors affecting the separation molecules.

Or

(b) Describe the principles and applications of Cross over Electrophoresis and Capillary Electrophoresis in forensic science.

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C–6776	Sub. Code 99043

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fourth Semester

Forensic Science

FORENSIC SEROLOGY AND DNA TYPING

(2020 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is the forensic significance of pollen and seeds?

2. Why is the root bulb of hair important in forensic analysis?

3. Differentiate between precipitation and agglutination reactions.

4. What is the significance of the Bombay blood group in forensic science?

5. How is saliva collected and preserved for forensic analysis?

6. What is the importance of urine analysis in forensic investigations?

7. What is the significance of DNA profiling in forensic science?

8. Explain the concept of mutations in human genetics.

9. Explain the importance of DNA databases in forensic investigations.

10. What is the forensic significance of Y-STR analysis.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b)

11. (a) Explain the steps involved in the collection, preservation, and packaging of hair evidence for forensic analysis.

Or

(b) Discuss the forensic significance of fibre evidence in criminal investigations. How are fibres classified?

12. (a) Describe the composition and functions of human blood. How is this information useful in forensic analysis.

Or

(b) Explain the process of blood group determination from fresh blood and discuss its forensic significance.

13. (a) Explain the process of identifying blood stains using confirmatory tests like Takayama and Teichmann tests,

Or

(b) How are saliva and sweat collected, preserved, and analyzed in forensic investigations.

14. (a) Discuss the molecular structure of DNA and its importance in forensics investigations.

Or

(b) What is mitochondrial DNA, and how is it used in forensic investigations.

15. (a) Explain the principle of Polymerase Chain Reaction (PCR) and its application in DNA amplification for forensic analysis..

Or

(b) Discuss Restriction Fragment Length Polymorphism (RFLP) analysis in detail.

Part C (3 × 10 = 30)

Answer **all** questions, choosing either (a) or (b)

16. (a) Explain the methods for identifying and analyzing pollen and seeds in forensic cases. What role do these biological materials play in linking a suspect to a crime scene?

Or

(b) Describe the forensic methods used for the analysis of hair evidence. Include details on medullary index, cuticle patterns, and root examination. How do these methods help in individualization and identification.

17. (a) Describe antigen-antibody reactions in detail. How are they used in forensic blood analysis, and what is the difference between precipitation, agglutination, and flocculation.

Or

(b) Explain the process of blood group determination from dried bloodstains and the forensic significance of blood grouping in criminal investigations.

18. (a) Describe the process of collecting, preserving, and analyzing semen in forensic investigations. What tests are used to identify semen, and how is it relevant in criminal cases?

Or

(b) Explain the forensic significance of other body fluids such as urine, sweat, and saliva. How are these fluids collected, preserved, and analyzed in a forensic laboratory?

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C–6778	Sub. Code 99044

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fourth Semester

Forensic Science

FORENSIC TOXICOLOGY

(2020 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Differentiate between acute and chronic poisoning.

2. Describe the significance of post-mortem findings in toxicology.

3. Give the name of two somniferous drugs.

4. Define a drug. Give two examples of commonly abused drugs.

5. What is solvent extraction?

6. Explain the function of separating funnels.

7. What is pharmacokinetics?

8. What is LD50 and ED50?

9. Write a few signs and symptoms of corrosive poisoning.

10. Which are the antidotes given in metallic poisoning?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b)

11. (a) Explain the medico legal post mortem findings in case of pesticide poisoning. Write a sample report.

Or

(b) Mention the different modes of administration of poison

12. (a) What are the features of accidental poisons? Give examples.

Or

(b) What is opium? Which are the major derivatives of opium?

13. (a) Explain the general extraction, isolation and clean-up procedures for drugs of abuse.

Or

(b) Explain the extraction and clean-up procedure for metallic poisons from viscera.

14. (a) Explain different types of absorption. Also explain the different sites of absorption.

Or

(b) Explain the various parenteral routes of drug administration.

15. (a) Explain the procedure of gastric lavage in detail.

Or

(b) What is an antidote? Write the classification of antidotes.

Part C

(3 × 10 = 30)

Answer **all** questions, choosing either (a) or (b)

16. (a) What are the different types of poisoning? Explain the signs and symptoms shown in case of irritant poisoning and the effect of it on the vital organs.

Or

(b) List out all ten types of poisons based on their chemical nature with examples.

17. (a) What are depressants? List few commonly abused depressants and chemical tests for their analysis.

Or

(b) What is opium? Explain the forensic tests for opium derivatives.

18. (a) Explain in detail the chromatographic separation of drugs and poisons. Write the chromatographic conditions used for the pesticides.

Or

(b) Explain the different types of poisonous snakes and the examination of snake poison.

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C–6779	Sub. Code 99051

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fifth Semester

Forensic Science

FORENSIC BALLISTICS AND TOOL MARKS

(2020 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Discuss the scope of forensic ballistics.

2. What is the diameter of a 12 bore shotgun?

3. Define internal ballistics and its significance in forensic analysis.

4. Discuss the chemical composition of primers and propellants.

5. Explain the concept of vacuum trajectory in external ballistics.

6. Discuss the behavior of bullets upon hitting a target in terminal ballistics.

7. What are the types of evidentiary clues encountered in forensic ballistics investigations?

8. Explain the significance of matching crime bullets and cartridge cases with test bullets and cartridge cases in forensic ballistics.

9. Define tool marks and their relevance in forensic investigations.

10. Explain the concept of class and individual characteristics of tool marks.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b)

11. (a) Describe the history of firearms and their lock mechanisms.

Or

(b) Explain the classification of firearms based on rifling and loading.

12. (a) Discuss the theory of recoil and its factors.

Or

(b) Explain the effects of muzzle flash and silencers in intermediate ballistics.

13. (a) Calculate the range of firing for shotguns based on burning, scorching, and blackening effects.

Or

(b) Explain the forensic aspects of ricochet in terminal ballistics.

14. (a) Explain the significance of range of firing determination for shotguns in forensic ballistics investigations, considering burning, scorching, blackening, and tattooing effects.

Or

(b) Discuss the formation, composition, and positioning of Gun Shot Residues (GSR) in forensic ballistics. Explain the methods used for collection, chemical analysis, and instrumental analysis of GSR.

15. (a) Describe the types of tool marks encountered in forensic investigations. Discuss how the characteristics of tool marks are utilized for forensic analysis and comparison.

Or

(b) Explain the principle and application of a comparison microscope in the examination and comparison of tool marks. Discuss its significance in forensic investigations.

Part C (3 × 10 = 30)

Answer **all** questions, choosing either (a) or (b)

16. (a) Explain the evolution of lock mechanisms in firearms and their relevance in forensic ballistics.

Or

(b) Discuss the effects of propellant burning on pressure development and the theory of recoil in firearms

17. (a) Analyze the behavior of different bullet types upon impact and the forensic aspects of ricochet.

Or

(b) Explain the importance of preserving and documenting tool marks at crime scenes and discuss the use of photography in the forensic analysis and comparison of tool marks.

18. (a) Explain the identification and comparison of bullets using a comparison microscope.

Or

(b) Describe the types of tool marks and their characteristics.

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C–6780	Sub. Code 99054

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fifth Semester

Forensic Science

FORENSIC ANTHROPOLOGY AND ODONTOLOGY

(2020 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is Forensic Anthropology, and why is it important in forensic investigations?

2. Explain the classification of bones and their role in estimating age in forensic cases.

3. Describe the process of ossification and its significance in determining gender using human skeletal points.

4. Discuss the anatomy of the humerus and its forensic importance.

5. Discuss the biochemical aspects of bones and ligaments.

6. How is demographic information estimated from skeletal remains? Explain the methods.

7. Explain the methods used for facial reconstruction in forensic anthropology.

8. How is facial superimposition performed, and what is its forensic value?

9. Define Forensic Odontology and its role in personal identification.

10. How is dental evidence used in mass disaster investigations?

Part B

($5 \times 5 = 25$)

Answer **all** questions, choosing either (a) or (b)

11. (a) Elaborate on the history and scope of Forensic Anthropology.

Or

(b) Describe the functions and characteristics of bones in the human skeletal system.

12. (a) Compare the rate of ossification in the human skeletal system with non- human ossification points for gender identification.

Or

(b) Explain the anatomy of the pelvis and its forensic significance.

13. (a) Explain the collection, preservation, and packaging of osteological evidence.

Or

(b) Discuss how sex and age estimation are carried out using skeletal remains.

14. (a) Compare two and three-dimensional methods of facial reconstruction in forensic anthropology.

Or

(b) Analyze the process of facial superimposition using photographic and computerized methods.

15. (a) Provide an overview of the history and scope of Forensic Odontology.

Or

(b) Discuss the recovery of forensic evidence from graves and the role of skeletal variation in identification.

Part C (3 × 10 = 30)

Answer **all** questions, choosing either (a) or (b)

16. (a) Elaborate on the importance of Forensic Anthropology in legal investigations, providing examples.

Or

(b) Discuss the duties and responsibilities of a forensic anthropologist at a crime scene.

17. (a) Explain the significance of ossification points for estimating age and gender in forensic cases.

Or

(b) Analyze the anatomy of different long bones and their role in forensic identification.

18. (a) Explain the procedure to determine age using dentition.

Or

(b) Explain the age estimation of skeletons between the age 35- 80.

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