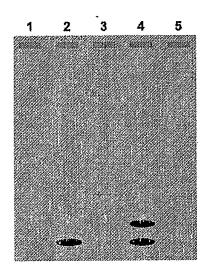(c) Discuss the applications of following Biochemical

techniques in forensic investigation.

(i) PCR

(ii) TLC

(iii) GCMS   (4,2,9)

(200)

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. There are **6** questions.

3. Attempt any **4** questions.

4. **All** questions carry equal marks.

5. Question no. **1** is compulsory.

P.T.O.

1. (a) Discuss the methods used for identification/ collection of following items at crime scene.

   (i) Latent blood

   (ii) To differentiate pigment and dye

   (iii) Latent fingerprints

   (iv) Shoe print in mud

   (v) A smudged hand written document on the table

   (vi) Tire marks in soft earth

   (b) Expand the following and their significance in crime investigation **(any five)** :

   (i) RFLP

   (ii) NHRC

6. (a) Define food adulteration. What are the common food adulterants present in milk, spices, ghee and sugar? How are they tested?

   (b) A woman reported that she was attacked by a masked assailant while she was walking back to home in the night. In this encounter, she scratched the arm of the assailant with her hand. The victim was not sure if the attacker was male or female. Forensic DNA analysts extracted and amplified the amelogenin gene from the epithelial cells under the victim's fingernails (supposedly belonging to the attacker) and from a buccal swab of the victim. Given below is the picture of the samples separated by gel electrophoresis. The victim's amelogenin UNA is in lane 2, and the amelogenin DNA from the fingernail scraping is in lane 4. What conclusion can you draw about the attacker from this result?

5. (a) Differentiate between the following :

   (i) Manual strangulation and ligature strangulation.

   (ii) Presumptive and confirmatory test

   (iii) RFLP and STR

   (b) Rigor mortis, livor mortis, and algor mortis are used to help determine time of death. Discuss the relevance of each method along with one condition that would render that method unsuitable or inaccurate for determining time of death.

   (c) Discuss the important information that can be derived from following parts of hair during forensic investigation :

   (i) Cortex

   (ii) Medulla

   (iii) Cuticle   (6,6,3)

   (iii) CODIS

   (iv) AFIS

   (v) STR

   (vi) EEG   (10,5)

2. (a) Discuss the appearance and causes of Cast-off spatter, Impact spatter, and Arterial Spray Spatter form during a crime.

   (b) List several skeletal features that can be used to estimate adult age when growth and tooth eruption processes have ended.

   (c) Discuss the principle of Brain Mapping and give its significance in forensic science.   (6,4,5)

3. (a) Describe two methods for drug screening and mention disadvantages of each in forensic biology.

(b) Discuss the one method for development of following fingerprints from crime scene :

    (i) Patent

    (ii) Plastic

    (iii) Latent

(c) Distinguish between polygraph and narco-analysis tests.   (5,6,4)

4. (a) What are the different approaches that can be used to recover original writing in the following cases :

    (i) The document obliterated with a different ink than that composed the original.

    (ii) The document demolished by chemical erasure.

    (iii) The document has been charred or burned.

    (iv) Recovery of indented writing

(b) Discuss the use of DNA profiling technology and facial reconstruction methods in identification of victims of mass disaster such as, plane crash.

(c) Write down the one method in each case for analysis of following body fluids available at crime scene :

    (i) Blood

    (ii) Saliva

    (iii) Vaginal fluid

    (iv) Semen

    (v) Urine   (4,6,5)