



**KENYATTA UNIVERSITY**  
**UNIVERSITY EXAMINATIONS 2011/2012**  
**SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF**  
**SCIENCE (CONSERVATION BIOLOGY)**  
**SCB 238: FORENSIC HAIR ANALYSIS**

DATE: MONDAY, 2<sup>ND</sup> APRIL 2012

TIME: 8.00 A.M. – 10.00 A.M.

**INSTRUCTIONS:**

**Answer All Questions in Section A and B and Any TWO questions in section C**

**Section A: Compulsory (20 marks) (Each question is one mark)**

1. The following statements are true about primary transfer of hair
  - a) it always involves the transfer of animal hair
  - b) it involves the transfer of hair from clothes, furniture and other objects in the environment
  - c) it cannot be used to link a suspect to a scene of crime
  - d) only hair from the scalp can be transferred in this manner
2. Macroscopic analysis of hair
  - a) Can conclusively identify the person from whom the hair sample was taken
  - b) Is based on the principle of immunofluorescence
  - c) Cannot differentiate animal from human hair
  - d) Involves the comparison of the hair in question with that from a known origin
3. About racial differences in hair
  - a) African hair has an oval cross-section with large granules
  - b) Samples from neonates and infants show the most reliable racial differences
  - c) Hair from Asian ancestry is usually kinky with a circular cross-section
  - d) Axillary hair has the most distinguishing racial characteristics
4. Regarding hair loss
  - a) Women are more prone to pattern baldness when compared to men
  - b) Androgenic alopecia is responsible for hair loss in less than 5% of men and women
  - c) The anagen phase is longer in individuals with premature hair loss
  - d) Genetics play a major role in premature hair loss
5. The following statements are true about hair growth cycles
  - a) Club hair are formed during the catagen phase
  - b) Hair shedding mainly occurs in the anagen phase
  - c) 90% of the hair follicles in a normal human scalp are in the anagen phase at any one time
  - d) The length of the catagen phase determines the ultimate length of the hair
6. The following describes the major ethnic groups that share similar hair characteristics except
  - a) African

- b) Asian
  - c) Caucasian
  - d) Mixed race
7. True about the hair shaft
- a) It extends just beneath the dermis
  - b) It is made up of dead cells and hard keratins
  - c) It provides good material for DNA analysis
  - d) All the above
8. The hair cuticle
- a) Cuticle cells do not contain melanin
  - b) Is the innermost layer of the hair shaft
  - c) Serves to protect the inner layers of the hair shaft
  - d) Is responsible for the bulk, shape and elasticity of hair
9. True of the dermal papilla
- a) Serves to direct the rest of the hair follicle to make hair fibres
  - b) Is found in the medulla of the hair shaft
  - c) Is only found in the larger hair fibres
  - d) a and c
10. The following statements are true about chemical composition of hair
- a) Melanin is a protein mainly produced by keratinocytes
  - b) Trichohyalin is a structural protein that is usually absent in the hair shaft
  - c) A and B
  - d) Trace quantities of metallic elements found in hair are deposited on the hair during growth or are absorbed by the hair from an external environment
11. Methods used to collect hair for forensic analysis include the following except
- a) Shaking
  - b) Pulling
  - c) Vacuuming
  - d) Picking
12. Regarding using hair for forensic analysis
- a) DNA examination should always be done before microscopic examination to avoid destroying the hair
  - b) Hairs with large roots and tissue are promising sources of nuclear DNA
  - c) Only scalp hair can be used
  - d) Gives better results compared with blood and body tissues like muscle
13. Advantages of using hair samples for drug analysis include the following except
- a) It is non invasive
  - b) Has the ability to analyse a large number of toxic and biologically essential substances
  - c) Does not require any special skills to analyse

- d) Hair has large detection periods for various substances compared with other biological analytes
14. Human hair compared to animal hair
- a) Human hairs are generally consistent in colour
  - b) Pigmentation of human hair is not evenly distributed
  - c) Human hair exhibits banding
  - d) Pigmentation of animal hair is usually more dense towards the medulla
15. About identification of human hairs
- a) Racial indicators apply only to body hair
  - b) Head and pubic hair are routinely forensically compared
  - c) The thickness of the hair has no role
  - d) All the above
16. The following statements are true about microscopic examination of hair found at a scene of crime
- a) Razor cut hair will have a rounded tip
  - b) Hair pulled out forcibly will have an even tip
  - c) Burned hair cannot be differentiated from normal hair
  - d) Dyed hair possess an unnatural cast or color
17. About testing for alcohol in hair
- a) The investigation procedures look for direct products of ethanol metabolism
  - b) Alcohol is deposited directly into hair
  - c) Fatty acid ethyl esters have no role as indicators of alcohol consumption
  - d) Sebaceous glands only lubricate growing hair
18. True about hair sample collected at a scene of crime
- a) Hair samples for microscopic analysis should be transported to the testing facility immersed in water
  - b) Should be transported under the chain of custody
  - c) Hair collected from a dead person cannot be used for DNA analysis
  - d) All the above
19. The following statements are true about the human hair cuticle except
- a) It is the translucent middle layer of the hair shaft
  - b) It consists of scales that point from the root end to the tip of the hair shaft
  - c) Human hair has flattened overlapping scales
  - d) All the above
20. True about the hair root sheaths
- a) The root sheaths only cover the bulb region
  - b) Stem cells of the hair follicle sit in the inner root sheath
  - c) The root sheaths function to protect the hair fibre as it develops
  - d) The outer root sheath is closest to the hair fibre

**SECTION B: Answer all questions (30 Marks)**

1. Describe the main distinguishing features between human and animal hair
2. Give an account the methods used to collect hair samples for forensic analysis
3. Describe the features a forensic scientist looks out for in performing microscopic hair analysis
4. Outline the use of hair samples in drug screening, with the example of alcohol
5. Briefly discuss the uses of DNA testing from hair samples
6. Describe the chain of custody in reference to collection and testing of hair samples

**SECTION C : Answer any two questions (10 marks each)**

1. Discuss the structure and function of the various layers of the hair shaft
2. Describe the phases of hair growth cycles
3. Discuss the ethnic differences in hair type and growth