JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS

DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR SCIENCE IN SECURITY AND FORENICS

4TH YEAR 2ND SEMESTER 2015/2016 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: IIT 3448

COURSE TITLE: BIOMETRIC AUTHENTICATION TECHNOLOGIES

EXAM VENUE: **STREAM: BSC COMP SECURITY**

DATE: DECEMBER 2016 **EXAM SESSION:**

TIME: 2.00 HOURS

INSTRUCTIONS:

1. **Answer Question 1 (Compulsory) and ANY other two questions**
2. **Candidates are advised not to write on the question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

QUESTION ONE **[30 MARKS]**

(a) Define the following as applies to biometric authentication technologies. [4 Marks]

(i) Biometric Data

(ii) Negative Recognition

(iii) Minutia Matching

(iv) Biometric Filters

(b) Give two reason why most commercial biometric systems available today do not store physical characteristics in their original form. [4 Marks]

(c) Name and explain the three groups in which biometric applications are classified. [6 Marks]

(d) Briefly explain any FOUR biological measurements that qualify as biometrics. [4 Marks]

(e) Use the biological measurements you have identified in Q1(d) above to compare the following biometric identifiers namely; DNA, Voice, Odor and Gait. [8 Marks]

(f) Consider a case where staffs at JOOUST has multiple identities associated different job roles i.e. different job roles has different access privileges for example a Professor who is a Dean of School can enjoy the privilege of university management and also that of a class lecturer. Critically review any two biometric techniques that can be considered when deploying an effective biometric system at the University. [4 Marks]

QUESTION TWO **[20 MARKS]**

(a) Citing relevant example in each case, explain the following types of biometric; [8 Marks]

(i) Visual Biometric

(ii) Spatial Biometric

(iii) Olfactory Biometric

(iv) Auditory Biometric

(b) With a well labelled diagram of a biometric system, explain its four main modules. [8 Marks]

(c) "There are two types of errors made by a biometric verification system". Explain. [4 Marks]

QUESTION THREE **[20 MARKS]**

(a) Using appropriate example in each case, differentiate between *1:1 biometric matching* and *1: M biometric searching*. [4 Marks]

(b) The following statements were provided by students when discussion multimodal biometric systems during their *Biometric Authentication Technologies* class. For each case, briefly explain in support.

(i) Some of the limitations of Unimodal biometric systems can be overcome by using multimodal biometric systems. [2 Marks]

(ii) A multimodal biometric system operates in any of the three different modes. [3 Marks]

(iii) There are three levels of fusion when combining two or more biometric systems. [6 Marks]

(iv) There are five scenarios in which multimodal biometric systems operate. [5 Marks]

QUESTION FOUR **[20 MARKS]**

(a) Briefly explain

(i) three systematic privacy concerns on biometrics. [6 Marks]

(ii) three ways of addressing the possible abuse of biometric information or its derivatives and related accountability procedures. [6 Marks]

(b) One of the most important factors in the success of a biometric system is its accuracy. Discuss. [8 Marks]

QUESTION FIVE **[20 MARKS]**

(a) Briefly explain how the following biometric technologies works; [12 Marks]

(i) Eye Analysis technology

(ii) Facial Recognition technology

(iii) Finger Scanning Verification and recognition

(iv) Biometric Geometry Analysis Technology

(b) Below are statements about biometric-based correlation filter theory. For each case, use a suitable diagram to support the statement.

(i) Correlation filters are attractive for object recognition due to their shift invariance and distortion tolerance. [4 Marks]

(ii) Correlation pattern recognition is applicable to biometric recognition in the spatial frequency domain. [4 Marks]

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