Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Science

End Sem Examination Dec 2024

FS3SE06 Digital Biometry

Programme: B.Sc. Branch/Specialisation: Forensic Science

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	What is the primary purpose of biometric identification? (a) To generate secure passwords (b) To uniquely identify individuals based on biological characteristics (c) To record attendance data (d) To store personal information in databases	**1**	1	1	1	4
	ii.	Biometric systems are generally categorized into which two main types- (a) Identification and recognition (b) Authentication and authorization (c) Physiological and behavioral (d) Scanning and storing	**1**	1	1	1	4
	iii.	Which layer of skin is primarily used in finger-scanning technology? (a) Epidermis (b) Hypodermis (c) Dermis (d) Subcutaneous	**1**	1	2	2	4
	iv.	The unique pattern in a fingerprint is created by (a) The color of skin (b) The friction ridges and valleys (c) The thickness of the skin layers (d) The temperature of the finger	**1**	1	1	2	

v.	Which of the following is not a basic fingerprint pattern type? (a) Loop (b) Arch (c) Ridge (d) Whorl	**1**		1	3
vi.	Which step in image processing focuses on isolating meaningful parts of an image? (a) Image segmentation (b) Image smoothing (c) Image compression (d) Image enhancement	**1**	1	1	3
vii.	The process of locating the iris in an image typically involves: (a) Finding the boundaries of the iris and the pupil (b) Measuring the color intensity (c) Matching the image to a stored iris template (d) Enhancing the contrast of the image	**1**	1	1	4
viii	The purpose of doubly dimensionless projection in iris recognition is to- (a) Convert the iris image into a standard coordinate system (b) Enhance the color contrast of the iris (c) Identify the pupil size and shape (d) Detect the sclera boundaries	**1**	3	1	4
ix.	Behavioral biometrics are often preferred because they- (a) Are easier to spoof (b) Can be passively collected during normal interactions (c) Require physical contact with the sensor (d) Do not require specialized software for analysis	**1**	3	1	
x.	Which of the following is a privacy concern specific to behavioral biometrics? (a) They cannot differentiate between two users with similar typing styles (b) Behavioral data might reveal additional information about user habits (c) They require physical contact, making them invasive (d) They require more complex sensors	**1**	1	2	

Q.2	i.	Define biometrics.	**2**	1	1	1
	ii.	What is the main difference between biometric and traditional identification techniques?	**3**	1	2	1
	iii.	Compare and explain physiological biometrics like finger-scan and facial-scan, including their strengths and weaknesses.	**5**	3	2	1
OR	iv.	Discuss the characteristics of a good biometric system and evaluate how Automated Fingerprint Identification Systems (AFIS) meet these criteria.	**5**	5	1	1
Q.3	i.	Define "minutiae" in fingerprint biometrics.	**2**	1	1	2
	ii.	Discuss the types and importance of minutiae determination in ensuring accurate fingerprint identification.	**8**	1	4	2
OR	iii.	Explain the various types of fingerprint pattern and their features in fingerprint matching.	**8**	1	1	2
Q.4	i.	List the fundamental steps in image processing.	**3**	1	2	3
	ii.	Compare and contrast spatial domain and frequency domain methods for image enhancement.	**7**	4	4	3
OR	iii.	Discuss how histogram techniques contribute to pixel classification and thresholding in image segmentation.	**7**	1	4	3
Q.5	i.	List and explain two main components of an iris recognition system.	**4**	1	1	4
	ii.	Write detail note on the components of iris system architecture.	**6**	1	1	4
OR	iii.	Discuss the importance of doubly dimensionless projection in maintaining the accuracy of iris recognition.	**6**	4	1	4
Q.6		Attempt any two:				
	i.	Explain components, working principles, strengths and weaknesses of signature-scan, keystroke scan.	**5**	3	1	5
	ii.	Analyze the privacy risks associated with behavioral biometrics and discuss possible solutions to mitigate them.	**5**	4	4	5
	iii.	Discuss the challenges of implementing privacy protections in behavioral biometric technologies.	**5**	4	1	5

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Marking Scheme
FS3SE06 (T) Digital Biometry (T)

Q.1	i)	b) To uniquely identify individuals based on biological characteristics	**1**
	ii)	c) Physiological and behavioral	**1**
	iii)	c) Dermis	**1**
	iv)	b) The friction ridges and valleys	**1**
	v)	c) Ridge	**1**
	vi)	a) Image segmentation	**1**
	vii)	a) Finding the boundaries of the iris and the pupil	**1**
	viii)	a) Convert the iris image into a standard coordinate system	**1**
	ix)	b) Can be passively collected during normal interactions	**1**
	x)	b) Behavioral data might reveal additional information about user habits	**1**
Q.2	i.	Definition 2 Marks	**2**
	ii.	Any three difference between biometric and traditional identification techniques. 1 Marks each	**3**
	iii.	Compare and Explain 3 Marks strengths and weaknesses. 2 Marks	**5**
OR	iv.	Characteristics 3 Marks Automated Finger print Identification System 2 Marks	**5**
Q.3	i.	Definition 2 Marks	**2**
	ii.	Types of minutiae 4 Marks Importance of Minutiae in Biometric Fingerprint Identification 4 Marks	**8**
OR	iii.	Different type of fingerprint pattern – 3 Marks Features - 5 Marks	**8**
Q.4	i.	Fundamental Steps List 3 Marks	**3**
	ii.	spatial domain 3.5 Marks frequency domain methods 3.5 Marks	**7**
OR	iii.	pixel classification 3.5 Marks Thresholding 3.5 Marks	**7**
Q.5	i.	Two main components of an iris recognition system 2 Marks each	**4**
	ii.	Complete iris system architecture 6 Marks	**6**
OR	iii.	Any six importance of doubly dimensionless projection 1 Mark each	**6**

Q.6

i. Signature Scan components, working principles, strengths and weaknesses. 2.5 Marks
Keystroke Scan components, working principles, strengths and weaknesses. 2.5 Marks **5**

ii. privacy risks 2.5 Marks
Possible Mitigation 2.5 Marks **5**

iii. Any five challenges of implementing privacy protections in behavioral biometric technologies. (1 Mark each) **5**

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