REG.NO.:

VIT
Vellore Institute of Technology

NAME OF THE SCHOOL : SCOPE
CONTINUOUS ASSESSMENT TEST - II

SLOT: B2 + TB2

FALL SEMESTER 2024-2025

Programme Name & Branch	: B. Tech and BCI
Course Code and Course Name	: BCSE323L, Digital Watermarking and Steganography
Faculty Name(s)	: Dr. Mukku Nisanth Kartheek, Dr. Sukanta Ghosh
Class Number(s)	: VL2024250101471, VL2024250101475
Date of Examination	: 14 October, 2024 from 9:30 AM to 11 AM.
Exam Duration	: 90 minutes Maximum Marks: 50

General instruction(s):

- Answer All Questions
- CO1 - Gathering the various concepts of steganography to access the sensitive information concealing of message, image, audio or video within another file.
- CO2 - Acquire the various concepts of watermarking for digital authentication and authorization schemes related to electronic documents, image and video.

Q.No	Question	M	CO	BL
1.	a) Assume, you are a data scientist working for a medical startup that focuses on developing portable ultrasound machines. These devices are used in remote areas where internet bandwidth is limited, making efficient image transmission a priority. The ultrasound images, captured in grayscale, often contain redundant information that could be compressed without losing critical diagnostic details. To address this challenge, your team is experimenting with the Hadamard transform, which helps reduce the size of the image data by identifying and compressing low-importance information while preserving key features necessary for diagnosis. You are tasked with testing the compression algorithm on a small, representative section of an ultrasound image. The following 4x4 block represents pixel intensities from an ultrasound scan: $\text{Ultrasound Block} = \begin{bmatrix} 140 & 142 & 135 & 138 \\ 144 & 139 & 140 & 137 \\ 133 & 136 & 142 & 145 \\ 138 & 140 & 137 & 139 \end{bmatrix}$ Apply the Hadamard transform to the 4x4 block of the ultrasound image to separate the critical data from the redundant information. (4 Marks) b) A university is looking to protect the integrity of its academic publications by embedding information that can verify the authenticity of the documents. However, they also want to ensure that if any content is modified, it can be easily detected. Which watermarking technique would best suit their needs? (2 Marks) c) An online streaming service is facing issues with unauthorized copies of their shows being circulated. They want to implement a solution that can withstand various manipulations, like downloading and re-uploading. What watermarking technique should they choose? (2 Marks) d) A photographer wants to share their images online while discouraging users from claiming ownership. They are also concerned about unauthorized edits	4+ 2+ 2+ 2= 10	CO 2	BL 5

VIT
Vellore Institute of Technology

REG.NO.:

NAME OF THE SCHOOL : SCOPE
CONTINUOUS ASSESSMENT TEST - II

FALL SEMESTER 2024-2025

SLOT: B2 + TB2

	to their work. What watermarking strategy would provide both ownership assertion and tamper detection? (2 Marks)			
2.	a) A media company is sending some important confidential media files with their watermark for detailed research and updating. Now some adversary dedicatedly corrupt and misplace this highly secrete media files. What are the possible attacks that the adversary may execute? (6 Marks) b) How geometric attacks in a media file can be executed by the adversary. (4 Marks)	6+4=10	CO2	BL3
3.	A telecommunications company is testing a new communication system for transmitting data over a noisy channel. As part of this testing, the company is tasked with ensuring the integrity of the transmitted data and determining whether or not a received media file or signal has been altered during transmission. The team must devise a content authentication procedure to verify the authenticity and integrity of the received data. How should the telecommunications company conduct the content authentication procedure for received media files or signals to determine if they have been altered during transmission? Discuss the methods and technologies that can be implemented, and the importance of ensuring data integrity in telecommunications.	10	CO2	BL4
4.	A government agency is tasked with securing sensitive diplomatic communications regarding an upcoming international treaty. They face threats from cyber espionage and surveillance by rival nations. The agency considers using steganography to embed critical messages within publicly available media, such as social media posts and video broadcasts. (a) Analyse the advantages of using steganography in this context compared to traditional methods of communication. (b) Discuss the specific properties of steganography that are crucial for ensuring the security and confidentiality of these diplomatic messages. (3 marks) (c) In the context of embedding sensitive diplomatic messages in social media and video broadcasts, what specific steganalysis techniques might rival nations employ to uncover hidden information, and how can the government agency proactively design their steganographic methods to withstand such analyses? (4 marks)	3+4+3=10	CO1	BL4
5.	The state intelligence unit has identified some recent cyber attacks from a terrorist organization. The attacks happened when defense organization was sending some confidential data from base center to other. To secure the confidentiality in data communication how LSB embedding and preprocessing palette embedding steganography processes can be incorporated?	10	CO1	BL3