

**VIT**Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

SLOT:F1+TF1

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech & Computer Science and Engineering
Course Code and Course Name : BCSE323L /Digital watermarking and Steganography
Faculty Name(s) : Prof. S. Jenicka, Prof. Saritha Murali
Class Number(s) : VL2025260101487, VL2025260101494
Date of Examination : 10-10-25
Exam Duration : 90 minutes
Maximum Marks: 50

General instruction(s):

- Answer All Questions
- Use of calculators is permitted
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes: (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
CO1- Learn the fundamental concepts, principles, characteristics and performance measures of digital watermarking and steganography.
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.	The scan centre in a hospital wanted to protect the scan images of patients from leaking out and so they thought of embedding a watermark that would stay during transmission through the network but could be erased when the same is given to the expert consultant for investigation. The following are the original pixel pairs of the scan image where embedding should happen. (35,23), (12,8), (15,5), (8,3), (14,6) The watermark bits to embed are 10101. Find the watermarked pair and elaborate on the procedure to recover the original pixel pair.	10	CO2	BL3
2.	A group of researchers were working on compression algorithms. They implemented a handful of lossy compression algorithms and applied them on images. They wanted to embed watermarks for authentication purpose in these compressed images and after embedding they wanted to ensure that the authentication mechanism would fail only if significant changes are seen in the watermarked work. Suggest a few types of watermarks that would support this criterion.	10	CO2	BL3



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3.	It is desired to perform steganography in palette images. A sender wanted to embed a secret message in a palette image. The set of 6 gray level palette colors available are 5, 20, 100, 45, 23 and 44. a) As per the optimal parity assignment algorithm, build parity subsets and set parity bits for each palette color. Show the stepwise calculations as per algorithm. b) Assuming the indices to palette colors as 1,2,3,4,5 and 6 sequentially, embed the message bits 011010. Find the palette color after embedding the message. c) Discuss how decoding happens and find the original indices and original palette colors d) Find the distortion introduced because of hiding message	(4x2.5)	CO3	BL4
4.	It is decided to watermark a cover work which is in the form of video. A team of researchers were passionately involved in identifying the better performing steganographic algorithm for video clips. Suggest any three methods they could choose and also suggest them a few performance metrics by which they can validate the chosen algorithms.	10	CO3	BL3
5.	Binary Hamming codes help us to embed message bits into pixels of a host image. a) If the message size (p) is 4 bits, how many pixels are required for embedding? b) If the set of pixel values are given by $g=(23, 44, 12, 91, 79, 50, 11)$ and message to embed is $m=(0,1,1)$, what will be the set of pixel values obtained after embedding? The parity check matrix H is given below. $H = \begin{pmatrix} 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 \end{pmatrix}$ c) If $Hx=m$, where x is the column vector of LSB's of gray level values given for embedding, then what will be the set of pixel values obtained after embedding? d) Are binary Hamming codes suitable for large payloads?	(4x2.5)	CO3	BL3