SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology

B. Tech. Semester VII

Subject Name: **Steganography and Watermarking** **Subject Code: BTEC14703**
Type of course: PEC
Prerequisite: Digital Signal Processing, Image Processing
Rationale: This course will help to strengthen the knowledge of various data hiding techniques and analyze the robustness of the security of data and documents.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. no.	Topics	Teaching Hrs.	Module % Weightage
1.	**Introduction:** Information hiding, steganography, and watermarking; History of Watermarking and Steganography; Importance of Digital Watermarking and Steganography; Applications of Watermarking and Steganography; Properties of watermarking system, Steganography and Stegnalysis system.	7	15
2.	**Watermarking with Side Information** Informed Embedding, Watermarking using side information, Dirty paper codes, Practical consideration of dirty paper codes, Broad approaches to dirty paper code design.	7	15
3.	**Perceptual Models:** Communication based models of watermarking; Geometric models of watermarking, Modeling watermark detection by correlation.	6	15
4.	**Robust Watermarking and Watermark Security:** Approaches, Robust to valumetric Distortions, Robustness to temporal and geometric distortion, security requirement, watermark security and cryptography	7	15
5.	**Content Authentication:** Exact Authentication, Selective Authentication, Localization, Restoration	6	10
6.	**Steganography:** Introduction, Text and Image Steganography: Data hiding in Raw	6	20

	(BMP) images, LSB embedding. Data hiding in palette (GIF) images- Palette format, Hiding by decreasing color depth, GIF Shuffle. Data hiding in JPEG images: J-Steg data hiding algorithm		
7.	**Steganalysis:** Principle, Approaches, ROC analysis, Sample pair analysis, Attacks using histogram characteristics function, Spatial domain stegnalysis, Feature selection	6	10

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
30	30	20	10	10	-

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Digital Watermarking and steganography	I.J.Cox, M.L.Miller	Morgen Kaufmann	2007	2nd
2.	Steganography in Digital Media	J.Fridrich	Cambridge University Press	2009	3rd

Course Outcome:

Sr. No.	CO Statement After learning this subject students will be able to	Marks % weightage
CO-1	differentiate between Steganography, Watermarking and Steganalysis	25
CO-2	Identify the importance of geometric models of watermarking and dirty paper codes.	20
CO-3	apply the concept of Robust watermarking security and content authentication in real life applications.	20
CO-4	analyze the concept of text and image steganography.	20
CO-5	describe spatial domain techniques and attacks on steganalysis techniques.	15

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	2	1	2	2		2	-	-	-	2	-	-	2	-

CO-2	3	2	1	1	1	2	2	-	-	-	2	-	-	2	-
CO-3	3	2	2	3	3	3	2	-	-	-	2	-	-	3	-
CO-4	3	3	3	2	3	3	3	-	3	3	2	3	-	3	-
CO-5	3	2	2	2	2	2	3	-	-	2	2	-	-	2	-

List of Practical:

1. To perform steganography in text, image and audio.
2. To implement any steganography algorithm
3. Case study on cover generation and cover detection technique.
4. To implement digital watermarking and specify the difference between steganography and watermarking
5. Case study on attacks on watermarks
6. Case study on LSB embedding and LSB steganalysis.
7. To perform masking and shifting operation using steganography algorithms
8. Perform DCT and DWT techniques for steganography
9. To perform Quantization Index Modulation (QIM) method
10. To perform Echo hiding methodology
11. Perform the techniques of Logo adding using spatial domain digital water marking techniques
12. Perform Frequency domain techniques to add a watermark in the DCT coefficients
13. Perform robust watermarking using spread spectrum techniques
14. Perform Digital signature techniques using public domain cryptography techniques.

List of Open Source Software:

- OpenCV