COURSE FILE

ON

DIGITAL IMAGE PROCESSING

Course Code – EC713PE

IV B.Tech ECE I-SEMESTER

A.Y.: 2022-2023

Prepared by

Dr. S.ANJANEYULU
Associate Professor

Head of the Department
Electronics and Communication Engg. Dept
SRI INDU INSTITUTE OF ENGG & TECH
Sheriguda(V), Ibrahimpatnam(M), R.R.Dist-501 510

PRINCIPAL
Sri Indu Institute of Engineering & Tech
Sheriguda(Vill), Ibrahimpatnam
R.R. Dist. Telangana-501 510.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Academic Year	2022-2023
Course Title	Microwave and Optical Communications
Course Code	EC713PE
Programme	B.Tech
Year & Semester	IV Year I-Semester
Branch & Section	ECE-C
Regulation	R18
Course Faculty	Dr. S. ANJANEYULU, Associate Professor

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Main Road, Sheriguda, Ibrahimpatnam, R.R. Dist. 501 510.
Campus Ph: 9640590999, 9347187999, 8096951507.

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Sri Indu Institute of Engineering & Technology

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VISION OF THE INSTITUTE

To become a premier institute of academic excellence by providing the world class education that transforms individuals into high intellectuals, by evolving them as empathetic and responsible citizens through continuous improvement.

MISSION OF THE INSTITUTE

IM1: To offer outcome-based education and enhancement of technical and practical skills.

IM2: To Continuous assess of teaching-learning process through institute-industry collaboration.

IM3: To be a centre of excellence for innovative and emerging fields in technology development with state-of-art facilities to faculty and students' fraternity.

IM4: To Create an enterprising environment to ensure culture, ethics and social responsibility among the stakeholders.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION OF THE DEPARTMENT

To become a recognized center in the field of Electronics and Communication Engineering by producing creative engineers with social responsibility and address ever-changing global challenges.

MISSION OF THE DEPARTMENT

DM1: To facilitate an academic environment that enables student's centric learning.

DM2: To provide state-of-the-art hardware and software technologies to meet industry requirements.

DM3: To continuously update the Academic and Research infrastructure.

DM4: To Conduct Technical Development Programs for overall professional caliber of Stake Holders.

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PROGRAM EDUCATIONAL OBJECTIVES

Program Educational objectives are to Promote:

PEO1: Graduates with a strong foundation in Electronics and Communication Engineering, Science and Technology to become successful in the chosen professional career.

PEO2: Graduates with ability to execute innovative ideas for Research and Development with continuous learning.

PEO3: Graduates inculcated with industry based soft-skills to enable employability.

PEO4: Graduates demonstrate with ability to work in interdisciplinary teams and ethical professional behavior.

PROGRAM SPECIFIC OUTCOMES

PSO 1: Design Skills: Design, analysis and development a economical system in the area of Embedded system & VLSI design.

PSO 2: Software Usage: Ability to investigate and solve the engineering problems using MATLAB, Keil and Xilinx.

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PROGRAM OUTCOMES

1. **ENGINEERING KNOWLEDGE**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **PROBLEM ANALYSIS**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **DESIGN/DEVELOPMENT OF SOLUTIONS**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **MODERN TOOL USAGE**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **THE ENGINEER AND SOCIETY**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **ENVIRONMENT AND SUSTAINABILITY**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **ETHICS**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **INDIVIDUAL AND TEAM WORK**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **COMMUNICATION**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions.

11. **PROJECT MANAGEMENT AND FINANCE**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **LIFE-LONG LEARNING**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE STRUCTURE & SYLLABUS

(Applicable From 2018-19 Admitted Batch)

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	EC701PC	Microwave and Optical Communications	3	0	0	3
2		Professional Elective – III	3	0	0	3
3		Professional Elective – IV	3	0	0	3
4		Open Elective - II	3	0	0	3
5	SM702MS	Professional Practice, Law & Ethics	2	0	0	2
6	EC703PC	Microwave and Optical Communications Lab	0	0	2	1
7	EC704PC	Industrial Oriented Mini Project/ Summer Internship	0	0	0	2
8	EC705PC	Seminar	0	0	2	1
9	EC706PC	Project Stage - I	0	0	6	3
		Total Credits	**14**	**0**	**10**	**21**

Professional Elective – III

EC711PE	Artificial Neural Networks
EC712PE	Scripting Languages
EC713PE	Digital Image Processing

Professional Elective – IV

EC721PE	Biomedical Instrumentation
EC722PE	Database Management Systems
EC723PE	Network Security and Cryptography

COURSE SYLLABUS

EC713PE) – DIGITAL IMAGE PROCESSING

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

SYLLABUS:

UNIT – I

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels,

Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hoteling Transform.

UNIT -II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, Linear and Non-Linear Gray Level Transformation, Local or Neighborhood Criterion, Median Filter, Spatial Domain High-Pass Filtering**.**

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (sharpening) Filter in Frequency Domain..

UNIT -III

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters**,** Constrained Least Squares Restoration, Interactive Restoration**.**

UNIT —IV

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, Thresholding, Region Oriented Segmentation**.**

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or Miss Transformation.

UNIT -V

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards

TEXT BOOKS:

- Digital Image Processing – Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008.
- Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010.

REFERENCE BOOKS:

- Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools – Scotte Umbaugh, 2nd Ed, CRC Press, 2011
- Digital Image Processing using MATLAB — Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
- Fundamentals of Digital Image Processing — A.K.Jain, PHI, 1989
- Digital Image Processing and Computer Vision — Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.
- Introductory Computer Vision Imaging Techniques and Solutions- Adrian low, 2008, 2nd Edition
- Introduction to Image Processing & Analysis — John C. Russ, J. Christian Russ, CRC Press, 2010.
- Digital Image Processing with MATLAB & Labview — Vipula Singh, Elsevie

Course Outcomes

Course Name: Digital Image Processing   **Course Code:** EC713PE

Class: B.Tech - IV Year ECE – C

Course Outcomes

After completing this course the student will be able to:

C412.1: Define digital image fundamentals, sampling and quantization, relationship
between pixels, different types of image transforms (Knowledge, Application)

C412.2: Design concepts including the topics of filtering and types of operations
(Synthesis)

C412.3: Solve the derivations of different types of restoration filters (Evaluation)

C412.4: Compare different types of segmentation and morphing concepts   (Analysis)

C412.5: Classify compression models and their redundancies   (Application)

C412.6 : Have the skill base summary to further explore advance the topics of digital image
processing   (Evaluation)

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CO - PO/PSO Mapping & Justification

Course Name: Digital Image processing   **Course Code:** EC713PE

Class: IV B.Tech ECE-C **A.Y.**: 2022-23   **Semester**: I

Course Outcomes

After Completing this course the student will be able to:

C412.1: Define digital image fundamentals, sampling and quantization, relationship
between pixels different types of image transforms (Knowledge, Application)

C412.2: Design concepts including the topics of filtering and types of operations
(Synthesis)

C412.3: Solve the derivations of different types of restoration filters (Evaluation)

C412.4: Compare different types of segmentation and morphing concepts
(Analysis)

C412.5: Classify compression models and their redundancies   (Application)

C412.6: Have the skill base summary to further explore advance the topics of digital
image processing   (Evaluation)

Mapping of course outcomes with program outcomes:

High-3   Medium-2   Low-1

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C412.1	2	2	-	-	-	-	-	-	-	-	-	-	3	2
C412.2	3	2	-	-	-	-	-	-	-	-	-	3	2	2
C412.3	3	2	-	-	-	-	-	-	-	-	2		3	3
C412.4	2	2	-	-	-	-	-	-	-	-	-	2	2	3
C412.5	3	2	-	-	-	-	-	-	-	-	2	-	2	3
C412.6	3	2	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**2.67**	**2**	-	-	-	-	-	-	-	-	**2**	**2.5**	**2.5**	**2.5**

Course: Digital Image Processing (C412)   **Class:** IV ECE - C

PO1.   **ENGINEERING KNOWLEDGE**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.   **PROBLEM ANALYSIS**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO11.   **PROJECT MANAGEMENT AND FINANCE**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

PO12.   **LIFE-LONG LEARNING**: Recognize the need for, and have the preparation and ab engage in independent and life-long learning in the broadest context of technological

PSO1.   **Design Skills:** Design, analysis and development a economical system in the area of Embedded system & VLSI design.

PSO2.   **Software Usage:** Ability to investigate and solve the engineering problems using MATLAB, Keil and Xilinx.

CO-PO Mapping Justification:

C412.1: Explain the basic elements and application of image processing, Analyze image sampling and quantization requirements. Solve Haar transform, slant transform, Walsh transform problems (knowledge)

	Justification
PO1	Students get the knowledge on Elements of digital image processing and analyze the image sampling and quantization
PO2	Students find image transformation problems on Walsh, slant, Haar transforms
PSO1	Through proficiency in image processing, students understand sampling and quantization, and expertise in transforms that are crucial for effective image analysis. Additionally, a combination of embedded system and VLSI design skills is essential for creating efficient and economical solutions in these domains.
PSO2	The combined use of MATLAB, Keil, and Xilinx provides a powerful and versatile toolkit for students working on a wide range of engineering problems, from algorithm Development and simulation to embedded system design and hardware implementation.

C412.2: Evaluate the models of image enhancement in (spatial and frequency domain) (Evaluation)

	Justification
PO1	Students acquire knowledge of different enhance methods in spatial and time domain
PO2	Students calculate the median filter problems, histogram manipulation
PO12	Students prepare and ability to engage in independent and life-long learning to Synthesis filtering and types of operations
PSO1	Students learn design, analysis, and development skills in embedded systems and VLSI design that are essential for creating efficient, reliable, and economical solutions in image enhancement applications. These skills encompass algorithm design, real-time analysis, resource optimization, and hardware implementations tailored to specific constraints and requirements in both spatial and frequency domains.
PSO2	The combination of MATLAB, Keil, and Xilinx tools provides a comprehensive toolkit for students to investigate, solve, and implement image enhancement algorithms in both the spatial and frequency domains. These tools, along with design, analysis, and development skills, contribute to the creation of economical solutions in the areas of embedded systems and VLSI design.

C412.3: Model the image restoration problems in both time and frequency domain model.(knowledge)

	Justification
PO1	Students get the knowledge degradation model, least mean square filters.
PO2	Easily calculate the restoration problems
PO11	Students knowledge and understanding management principles of designs concepts apply to one's work to manage projects
PSO1	Students learn design, analysis, and development skills in both time and frequency domains that are critical for creating efficient and economical solutions in image restoration. These skills are applied in the context of embedded systems and VLSI design to meet real-time constraints, optimize resource utilization, and balance computational efficiency with Economic considerations.
PSO2	The combination of MATLAB, Keil, and Xilinx tools provides a comprehensive toolkit for students to investigate, solve, and implement image restoration algorithms in both time and frequency domains. These tools, along with design, analysis, and development skills, contribute to the creation of economical solutions in the areas of embedded systems and VLSI design

C412.4: Explain the Methodology for image segmentation and illustrate morphological image processing (Analysis).

	Justification
PO1	Students get the knowledge, detection and discontinuities.
PO2	Students calculate error rate, probability of error by using mathematical equations.
PO12	Students acquire knowledge on Compare different types of segmentation and morphing analysis understanding management principles of designs concepts apply to one's work to manage projects
PSO1	By applying design, analysis, and development skills in the fields of embedded systems and VLSI design, students can create efficient, reliable, and economical solutions for image Segmentation. These skills enable the selection or design of algorithms tailored to specific constraints, optimization of resource usage, and consideration of real-time and power efficiency, ultimately contributing to successful implementation in embedded systems and VLSI circuits.
PSO2	Students learn the use of MATLAB, Keil, and Xilinx tools, along with design, analysis, and development skills, which facilitates the entire process of image segmentation and Morphological image processing. These tools empower engineers to investigate, prototype, analyze, and implement efficient and economical solutions for image segmentation in both software and hardware domains.

C412.5: Explain image compression models and analyze various compression Techniques (Applications).

	Justification
PO1	Get the basics image compression models
PO2	Easily evaluate the compression techniques
PO11	Students get knowledge and understanding management principles of application to compression models and their redundancies
PSO1	Design, analysis, and development skills in embedded systems and VLSI design play a Crucial role in the successful implementation of image compression models. These skills are essential for students for selecting, optimizing, and integrating compression algorithms, Ensuring that they meet real-time constraints, and designing efficient hardware architectures.
PSO2	Students with the combination of MATLAB, Keil, and Xilinx tools, coupled with design, analysis, and development skills, can facilitate the exploration, implementation, and optimization of various image compression techniques.

C412.6: Have the skill base summary to further explore advance the topics of digital image processing (Evaluation)

	Justification
PO1	Student gets the knowledge of image fundamentals and its transforms.
PO2	Students calculate error rate, probability of error by using mathematical equations.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

ACADEMIC CALENDAR 2022-23

B. Tech./B. Pharm. IV YEAR I & II SEMESTERS

I SEM

S. No	Description	Duration	
		From	**To**
1	Commencement of I Semester classwork	**29.08.2022**	
2	1st Spell of Instructions (including Dussehra Recess)	29.08.2022	31.10.2022 (9 Weeks)
3	Dussehra Recess	03.10.2022	08.10.2022 (1 Week)
4	First Mid Term Examinations	01.11.2022	07.11.2022 (1 Week)
5	Submission of First Mid Term Exam Marks to the University on or before	12.11.2022	
6	2nd Spell of Instructions	09.11.2022	03.01.2023 (8 Weeks)
7	Second Mid Term Examinations	04.01.2023	10.01.2023 (1 Week)
8	Preparation Holidays and Practical Examinations	11.01.2023	19.01.2023 (1 Week)
9	Submission of Second Mid Term Exam Marks to the University on or before	17.01.2023	
10	End Semester Examinations	20.01.2023	02.02.2023 (2 Weeks)

Note: No. of Working/instructional days: 94

II SEM

S. No	Description	Duration	
		From	**To**
1	Commencement of II Semester classwork	**03.02.2023**	
2	1st Spell of Instructions	03.02.2023	31.03.2023 (8 Weeks)
3	First Mid Term Examinations	01.04.2023	08.04.2023 (1 Week)
4	Submission of First Mid Term Exam Marks to the University on or before	15.04.2023	
5	2nd Spell of Instructions	10.04.2023	17.06.2023 (10 Weeks)
6	**Summer Vacation**	15.05.2023	27.05.2023 (2 Weeks)
7	Second Mid Term Examinations	19.06.2023	24.06.2023 (1 Week)
8	Preparation Holidays and Practical Examinations	26.06.2023	01.07.2023 (1 Week)
9	Submission of Second Mid Term Exam Marks to the University on or before	01.07.2023	
10	End Semester Examinations	03.07.2023	15.07.2023 (2 Weeks)

Note: No. of Working/ instructional days: 91

REGISTRAR

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Class Timetable

CLASS: IV-B.Tech ECE-C **A.Y:2022-23** **SEMESTER: I** **LH: B-202**

TIME/DAY	I 9:40-10:30	II 10:30-11:20	III 11:20-12:10	IV 12:10-1:00	1:00-1:30	V 1:30-2:20	VI 2:20-3:10	VII 3:10-4:00
MON	DIP	NS&C	MW&OC	JAVA	L U N C H	PPL&E	PPL&E	JAVA
TUE	MW&OC	LIB	NS&C	DIP		INT	CO-CU/DAA	
WED	NS&C	MW&OC	DIP	COUN		JAVA	MW&OC LAB / SEMINAR	
THU	PPL&E	PROJECT STAGE-I				DIP	MW&OC	SPORTS
FRI	JAVA	PROJECT STAGE-I				DIP	NS&C	PPL&E
SAT	NS&C	IOMP				MW&OC	SEMINAR / MW&OC LAB	

*(T) – Tutorial Concern Faculty

Course Code	Course Name	Name of the Faculty	Course Code	Course Name	Name of the Faculty
EC701PC	MW&OC-Microwave and Optical Communications	S.Naresh	EC703PC	MW&OC LAB-Microwave and Optical Communications Lab	Dr.S.Anjaneyulu /S.Naresh
EC713PE	DIP-Digital Image Processing(Prof.Elec.–III)	Dr.S.Anjaneyulu	EC704PC	IOMP-Industry Oriented Mini Project	A.Apsara/G.Anitha/P.Meena
			EC705PC	Seminar	Dr.T.Ramakrishna/G.Swathi/G.Anusha
			EC706PC	Project Stage-I	K.Srikanth/B.Ashwini/T.Divya
EC723PE	NS&C-Network Security and Cryptography (PE – IV)	Dr.T.Ramakrishna	LIB	Library	K.Rajender/D.Aruna Kumari
			SPORTS	Sports	Y.Rajani
CS703OE	JAVA- Java Programming (Open Elective – II)	Ch.Prabhakar	COUN	Counseling	A.Vaani/Dr.S.Anjaneyulu/K.Bhaskar Reddy
			INT	Internet	A.Vaani/P.Krishna Rao
SM702MS	PPL&E- Professional Practice, Law & Ethics	K.Balakrishna	CO-CU/DAA	Co-Curricular/Department Association Activities	Y.Raju/P.Krishna Rao

Class Incharge   Head of The Department
Electronics and Communication Engg. Dept

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Lesson Plan with Lesson Plan with Number of Hours/Periods, Teaching Aids/Methods, Text/Reference Book

Course Name: DIGITAL IMAGE PROCESSING   **Course Code:** EC713PE

Class: B.Tech- IV Year ECE – C   **Session Duration:** 50 minutes

UNIT I - Syllabus

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels,

Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hoteling Transform.

Number of Sessions Planned	TOPIC	Teaching method/Aids	REFERENCE
1	Digital Image Fundamentals	Black Board,ppt	R3,T1
2	Sampling and Quantization	Black Board,	R3,T1
1	Relationship between Pixels	Black Board	R3,T1
2	2-D FFT, Properties	Black Board	R3,T1
1	Sampling Theorem	Black Board	R3,T1
1	Walsh Transform	Black Board	R3,T1,W1
1	Hadamard Transform	Black Board	R3,T1,
2	Discrete Cosine Transform	Black Board	R3,T1,T2
1	Haar Transform	Black Board	R3,T1,T2
2	Slant Transform	Black Board	R3,T1,T2
1	Hoteling Transform	Black Board	R3,T1

Course Outcome (C412.1): Define digital image fundamentals, sampling and quantization, relationship between pixels, different types of image transforms

Total Number of Hours/Unit: 15

UNIT –II Syllabus

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, Linear and Non-Linear Gray Level Transformation, Local or Neighborhood Criterion, Median Filter, Spatial Domain High-Pass Filtering**.**

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (sharpening) filter in Frequency Domain.

Number of Sessions Planned	TOPIC	Teaching method/Aids	REFERENCE
1	Introduction	Black Board	R3,T1,T2
2	Image Enhancement in Spatial Domain	Black Board	T2
1	Enhancement Through Point Operation	Black Board, Role Play	T2
2	Types of Point Operation	Black Board, Role Play	T2
1	Histogram Manipulation	Black Board	T2, W2
2	Linear and Non — Linear Gray Level Transformation	Black Board	T2,T1
1	Local or Neighborhood Operation	Black Board	T2

Course Outcome (C412.2): Design concepts including the topics of filtering and types of

operations

Total Number of Hours/Unit: 10

UNIT –III

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

Number of Sessions Planned	TOPIC	Teaching method/Aids	REFERENCE
1	Degradation Model	Black Board,PPT	T1,T2
2	Algebraic Approach to Restoration	Black Board	T1,T2
2	Inverse Filtering	Black Board	T1,T2
1	Least Mean Square Filters	Black Board	T1,T2,W3
1	Constrained Least Squares Restoration	Black Board,PPT	T1,T2
1	Interactive Restoration.	Black Board	T1,T2

Course Outcome (C412.3): Solve the derivations of different types of restoration filters

Total Number of Hours/Unit: 8

UNIT —IV

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, Thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or MissTransformation.

Number of Sessions Planned	TOPIC	Teaching method/Aids	REFERENCE
1	Detection of Discontinuities	Black Board	T1
1	Edge Linking And Boundary Detection	Black Board	T1

		Thresholding	Black Board	T1,T2
2		Region Oriented Segmentation	Black Board	T1
1		Dilation and Erosion	Black Board	T1, W4
1		Dilation	Black Board	T1,T2
2		Structuring Element Decomposition	Black Board	T1
	1	Erosion	Black Board	T1,T2
	2	Combining Dilation and Erosion	Black Board	T1
	1	Opening and Closing	Black Board, Quiz	T1
	1	The Hit or Miss Transformation.	Black Board	T1,T2
	2			

Course Outcome (C412.4): Compare different types of segmentation and morphing concepts

Total Number of Hours/Unit: 15

UNIT –V -Syllabus

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards

Number of Sessions Planned	TOPIC	Teaching method/Aids	REFERENCE
1	Redundancies and their Removal Methods	Black Board	T1
1	Fidelity Criteria	Black Board	T1,T2
1	Image Compression Models	Black Board, Buzz Group	T1
2	Huffman and Arithmetic Coding	Black Board	T1,T2,W5
2	Error Free Compression	Black Board	T1
1	Lossy compression	Black Board	T1
1	Lossy and lossless predictive coding	Black Board	T1
1	Transform based compression	Black Board	T1
1	JPEG 20000 standards	Black Board	T1

Course Outcome (C412.5): Classify compression models and their redundancies

Total Number of Hours/Unit: 11

TEXT BOOKS:

- Digital Image Processing – Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008.
- Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010.

REFERENCE BOOKS:

- Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools – ScotteUmbaugh, 2nd Ed, CRC Press, 2011
- Digital Image Processing using MATLAB — Rafael C. Gonzalez, Richard E Woods and Steven
  L. Eddings, 2nd Edition, TMH, 2010.
- Fundamentals of Digital Image Processing — A.K.Jain, PHI, 1989
- Digital Image Processing and Computer Vision — Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.
- Introductory Computer Vision Imaging Techniques and Solutions- Adrian low, 2008, 2nd Edition
- Introduction to Image Processing & Analysis — John C. Russ, J. Christian Russ, CRC Press, 2010.
- Digital Image Processing with MATLAB & Labview — Vipula Singh, Elsevier.

WEB REFERENCES

Course Name: Digital Image Processing.　　　　　　　　　　　**Course Code:** EC713PE
Class: B.Tech- IV ECE – C

W1.

https://www.academia.edu/31848094/Digital_Image_Processing_Digital_Image_Fundamentals_2_Digital_Image_Fundamentals

W2.

https://link.springer.com/search?query=Image+Enhancement+%28Spatial+Domain%29&facet-eisbn=978-3-662-11565-7&facet-content-type=Chapter

W3.

https://onlinelibrary.wiley.com/action/doSearch?AllField=Image+Restoration

W4.

https://ieeexplore.ieee.org/search/searchresult.jsp?newsearch=true&queryText=Image%20Segmentation

W5.

https://www.studypool.com/documents/22632314/image-compressiom

Lecture Notes

Course Name: Digital Image Processing   **Course Code:** EC713PE

Course Year/ Semester: B.Tech IV ECE – C Section

S.No	Unit Number	Lecture Notes Link
1	Unit-1	https://drive.google.com/file/d/1dluYt98U_Ggu68r-szHnJ2gdvV3QQheb/view?usp=drivesdk
2	Unit-2	https://drive.google.com/file/d/1t-bxUbW-xncjNgpvplAN2uBVHFg8zIxr/view?usp=drivesdk
3	Unit-3	https://drive.google.com/file/d/1MspR6wV3Ra6wRY1FXKxJaoVFI7d9V2BK/view?usp=drivesdk
4	Unit-4	https://drive.google.com/file/d/18RPzEWL-3VB5PwkvYJR6IcmNk_HiJ9q2/view?usp=drivesdk
5	Unit-5	https://drive.google.com/file/d/1XerYFYvJWxgZrCX3ppkvdX5YxaOnlt8L/view?usp=drivesdk

List of PPTs

Course Name: Digital Image Processing
Course Code: EC713PE

S.No	Topic Name& PPT Link
1	**LEAST SQUARE RESTORATION:** https://docs.google.com/presentation/d/1WAhd3G9pdXCjD_0ivQM4ojn85pG5bDGD/edit ?usp=drivesdk&ouid=114895267225773199689&rtpof=true&sd=true
2	**IMAGE RESTORATION:** https://docs.google.com/presentation/d/1WCJZ6dRR-MPsfhlTQxaF2wUE8jOBR11z/edit?usp=drivesdk&ouid=114895267225773199689&rtpof=true&sd=true
3	**DIGITAL IMAGE PROCESSING:** https://docs.google.com/presentation/d/1W95z5_RcwrmLjfXkBYIkc-VSTO-EHdCE/edit?pli=1#slide=id.p19

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, July/August- 2022
DIGITAL IMAGE PROCESSING
(Electronics and Communication Engineering)

Time: 3 Hours   Max.Marks:75

Answer any five questions
All questions carry equal marks
- - -

1.a) Explain three different level processes in image processing.
  b) Derive the basis function of Walsh transform.
  c) Enlist the applications of KL transform.   [5+5+5]

2.a) Discuss the image processing steps with suitable examples.
  b) Compute Haar Transform for following N Value.
     N=8.   [8+7]

3.a) Differentiate between image enhancement and image restoration.
  b) What is the point processing? Explain about its role in image enhancement and explain different types of it.   [5+10]

4.a) Discuss how the various filter masks are generated to sharpen images in spatial filters.
  b) With the numerical illustration explain the steps performed for Histogram processing.
                                                                                [8+7]

5.a) Prove that median filter is a nonlinear filter with an example.
  b) Explain the need for Image restoration with example.   [8+7]

6.a) Draw the degradation model and explain the different sources of degration.
  b) Explain linear position invariant degradation employed for image restoration.   [8+7]

7.a) Discuss segmentation using morphological watersheds.
  b) Explain the significance of thresholding in image segmentation.   [8+7]

8.a) What are the different image compression standards? Explain.
  b) Describe arithmetic coding with an example for compression of image.   [7+8]

---oo0oo---

Code No: 157BF

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, February/March - 2022
DIGITAL IMAGE PROCESSING
(Electronics and Communication Engineering)

Time: 3 Hours   Max. Marks: 75

Answer Any Five Questions
All Questions carry equal marks
- - -

1.a) Explain the different fundamental steps in image processing with examples.
  b) What is quantization in image processing? Why is it needed? What are the effects of it?
                                                                                  [8+7]

2.a) How the Discrete Cosine Transform is used to process the digital image? Write its Kernel function.
  b) Determine the KL transform for the following image segment.
        0001
        [0010]   [7+8]
        0011

3.a) What is Histogram? Explain Histogram equalization with example.
  b) What is threshold and how to choose threshold value?   [7+8]

4.a) How median filter is used to remove noise in an image?
  b) Explain how high pass filter is used to sharpen the image.   [8+7]

5.a) Draw the degradation model and explain how this degradation occurs in an image.
  b) Write about image restoration? Write some examples.   [8+7]

6.a) Design a Wiener filter for image restoration and discuss its merits and demerits.
  b) What is meant by an interactive restoration?   [7+8]

7.a) Explain a region growing method to segment an image and what are the drawbacks of this method.
  b) What is meant by hit or miss transformation? How it is used for segmentation of an image?
                                                                                  [7+8]
8.a) Draw the compression model and explain the function of each block.
  b) Determine the Huffman code for the following image segment and find compression ratio with reference to binary code?   [8+7]

$$\begin{bmatrix} 2 & 1 & 4 & 5 & 5 & 4 \\ 2 & 3 & 4 & 1 & 2 & 3 \\ 2 & 3 & 3 & 4 & 5 & 5 \\ 2 & 1 & 2 & 3 & 4 & 5 \end{bmatrix}$$

---ooOoo---

Internal Question Papers Keys

I - Mid Examinations, NOV -2022

Subject: **DIGITAL IMAGE PROCESSING**   Max. Marks: 10   Time:60 mins

Year & Branch: IV –ECE(A, B, C)   Date:09/11/2022(FN)

Answer any **TWO** Questions. All Question Carry Equal Marks   2*5=10 marks
(This question paper is prepared with Course Outcome and BT's mapping)

1. Define Walsh transform for the order N=4 on image transformation?   5   (C412.1)
(Analysis)
2. Write Fundamental steps in digital image processing with neat diagram?   5   (C412.1)
(Knowledge)
3. What is the use of median filter and explain median filter with an example?   5   (C412.2)
(Application)
4.Explain image degradation model in image Restoration?   5   (C412.3)
(knowledge)

Question Paper Mapping with CO's
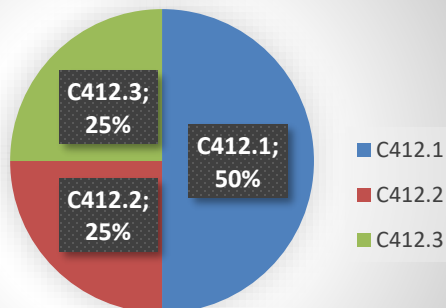
Question Paper Mapping with BT
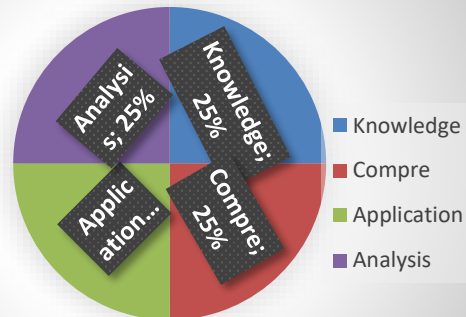
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
DIGITAL IMAGE PROCESSING
(Objective Exam)
B.TECH IV YEAR, I SEM, I MID-TERM EXAMS, NOV-2022.

ROLL NO: [   ]   NAME: _____ MARKS [   ]

Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Max Marks: 10

 CHOOSE THE CORRECT ANSWERS

1. $L = 2^3$ would have   [   ]

   A) 2 levels B) 4 levels C) 6 levels D) 8 levels

2. Digital images are displayed as a discrete set of   [   ]

   A) Values B) numbers C) frequencies D) intensities

3. In MxN, M is no of   [   ]

   A) Intensity levels   B) colors C) rows D) columns

4. Each element of matrix is called   [   ]

   A) Dots B) coordinate C) pixels D) value

5. Imaging system produces   [   ]

   A) High resolution image   B) voltage signal C) analog signal D) digitized image

6. Digitizing coordinate values is called   [   ]

   A) Radiance B)Iluminance C) Sampling D) Quantization

7. Smallest element of an image is called   [   ]

    A) Pixels   B) Dot C) Coordinate D) Digits

8. No of bits to store image is denoted by formula   [   ]

   A)b = NxK B) b = MxN C) b = MxNxK D) b = MxK
9. Digitizing amplitude values is called   [   ]

    A) Radiance B) Iluminance   C)Sampling D)Quantization

10. Spatial domain Filters deals with   [   ]

   A) Pixels B) Dots C) Intensities D) Frequencies

FILL IN THE BLANKS:

11. Binary image has------------- levels.

12. Define image   -------------------------------------

13. Define pixel   -------------------------------------

14. Define DIP   ---

15 Matrix is made up of   -

16. Range of gray level image-----------------------------

17. Image degradation stands for---------------------------------

18. Increase the brightness of image g(m,n)= -------------------------------------

19. Define image compression---------------------------------

20. Formula for HAAR Transform k=-------------------------------------

II - Mid Examinations, JAN -2023

Year & Branch: IV –ECE (A,B,C)   Date: 11/01/2023(FN)

Subject: **DIGITAL IMAGE PROCESSING**   Max. Marks: 10   Time: 60 mins

Answer any **TWO** Questions. All Question Carry Equal Marks   2*5=10 mark

1. What is Histogram and Explain Histogram manipulation with an example? 5   (C412.2)
(Knowledge)
2. Explain about fidelity criteria?   5   (C412.5)
(Evaluation)

3. Calculate Huffman efficiency for the word COMMITTEE?   5   (C412.5)
(Knowledge)
4. Explain about Hit or Miss Transform?   5   (C412.4)
(Knowledge)

Question Paper Mapping with BT
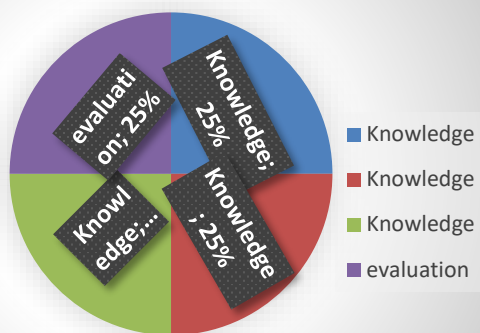
Question Paper Mapping with CO's
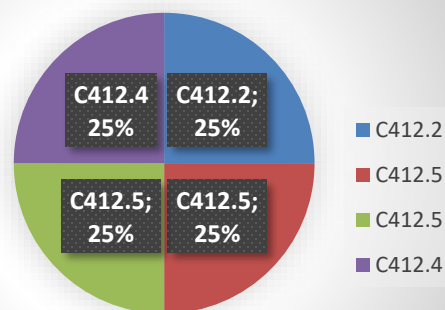
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
DIGITAL IMAGE PROCESSING
(Objective Exam)
B.TECH IV YEAR, I SEM, II MID-TERM EXAMS, JAN-2023.

ROLL NO ☐ NAME: _____ MARKS ☐

Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Max Marks: 10

CHOOSE THE CORRECT ANSWERS

1. $L = 2^3$ would have   [   ]

   A) 2 levels B) 4 levels C) 6 levels D) 8 levels

2. Digital images are displayed as a discrete set of   [   ]

   A) Values B) numbers C) frequencies D) intensities

3. In MxN, M is no of   [   ]

   A) Intensity levels   B) colors C) rows D) columns

4. Each element of matrix is called   [   ]

   A) Dots B) coordinate C) pixels D) value

5. Imaging system produces   [   ]

   A) High resolution image   B) voltage signal C) analog signal D) digitized
image

6. Digitizing coordinate values is called   [   ]

   A) Radiance B)Iluminance C) Sampling D) Quantization

7. Smallest element of an image is called   [   ]

   A) Pixels B) Dot C) Coordinate D) Digits

8. No of bits to store image is denoted by formula   [   ]

          A) b = NxK B) b = MxN C) b = MxNxK D) b = MxK

9. Digitizing amplitude values is called   [   ]

    A) Radiance B) Iluminance   C)Sampling D)Quantization

10. Spatial domain Filters deals with   [   ]

    A) Pixels B) Dots C) Intensities D) Frequencies

FILL IN THE BLANKS:

11. Binary image has----------levels.

12. Define image   --------------------------------------

13. Define pixel   -------------------------------------

14. Define DIP   ---

15 Matrix is made up of   -

16. Range of gray level image------------------------------

17. Image degradation stands for--------------------------------

18. Increase the brightness of image g(m,n)= -------------------------------------

19. Define image compression--------------------------------

20. Formula for HAAR Transform k=-------------------------------------

Internal Question Papers Keys

Course Name: Digital Image Processing

Course Code: EC713PE   **A.Y.:** 2022-23   **Semester:** I

Course Year / Semester: B.Tech IV ECE – C Section

S.No	Key Paper Link
1	**Mid-I Descriptive Paper Key Link:** https://drive.google.com/file/d/1YbkD8RPpFNKn-pVHjmnWE7I7u5Y4Lg-I/view?usp=drivesdk
2	**Mid-I Objective Paper Key Link:** https://docs.google.com/document/d/1Yed9Btp0IwU9dcrdOoIesUH7-8mKQ1_i/edit?usp=drivesdk&ouid=114257865500794002782&rtpof=true&sd=true
3	**Mid-II Descriptive Paper Key Link:** https://drive.google.com/file/d/1YcSMs098zKvXvH6C29GK7AGGs4sZk-J3/view?usp=drivesdk
4	**Mid-II Objective Paper Key Link:** https://docs.google.com/document/d/1Yed9Btp0IwU9dcrdOoIesUH7-8mKQ1_i/edit?usp=drivesdk&ouid=114257865500794002782&rtpof=true&sd=true

Assignment Proofs

SUBJECT: DIGITAL IMAGE PROCESSING

ASSIGNMENT- 1

1. Define Walsh transform for the order N=8 on image transformation? (C412.1) (Analysis)
2. Define Haar transform for the order N=4 on image transform? (C412.1) (Analysis)
3.   Write Fundamental steps in digital image processing with neat diagram? (C412.1) (Knowledge)
4. Explain filtering in Frequency domain in image Enhancement?   (C412.1) (Knowledge)
5. What is image degradation model in image Restoration?   (C412.3) (Knowledge)

SUBJECT: DIGITAL IMAGE PROCESSING
ASSIGNMENT- 2

1. Explain least mean square filter in image Restoration   (C411.3)   (Application)

2. Explain constrained Restoration method   (C412.3)   (Evaluation)

3. Explain Fidelity criteria in image compression   (C412.5)   (Analysis)

4. Explain in detail about JPEG compression   (C412.5)   (Knowledge)

Assignment Proofs

Course Name: Digital Image Processing

Course Code: EC713PE   **A.Y.:**2022-23

Course Year / Semester: B.Tech IV ECE – C Section

S.No	Assignment Number	Assignments Proofs Link
1	Assignment-1	https://drive.google.com/file/d/1Wo1ePmQoABXii7TcMfwOC_dSyBhI_bUx/view?usp=sharing
2	Assignment-2	https://drive.google.com/file/d/1WloNQp0i179L2Z_Vuzw3JNS2v68kinsd/view?usp=drivesdk

TUTORIAL TOPICS

SUBJECT : DIGITAL IMAGE PROCESSING

S.NO	Unit	TOPIC	Number of Sessions Planned	Teaching method/Aids	REFERENCE
1.		Digital Image Fundamentals	1	Black Board.PPT	R3,T1
2.		Sampling and Quantization	1	Black Board, quiz	R3,T1
3.		Walsh transform	1	Black Board	R3,T1,W3
4.	1	Slant transform	1	Black Board,	R3,T1,T2
5.		Enhancement Through Point Operation	1	Black Board,	T2
6.		Histogram Manipulation	1	Black Board	T2,W3
7.	2	Median Filter	1	Black Board, video	W3,T1,T2
8.		Filtering in Frequency Domain	1	Black Board	T2
9.		Degradation Model	1	Black Board,PPT	T1,T2,W3
10		Inverse Filtering	1	Black Board	T1,T2,W3
11		Least Mean Square Filters	1	Black Board	T1,T2,W3
12	3	Constrained Least Squares Restoration	1	Black Board,PPT	T1,T2,W3
13		Thresholding	1	Black Board	T1,T2
14	4	Hit or Miss Transformation	1	Black Board	T1,T2
15	5	Fidelity Criteria	1	Black Board	T1,T2
16	6	Huffman and Arithmetic Coding	1	Black Board	T1,T2

TEXT BOOKS:

T1.Digital Image Processing -Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008 T2.Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010

REFERENCES:

R1.Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools – ScotteUmbaugh, 2nd Ed, CRC Press, 2011

R2.Digital Image Processing using MATLAB - Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.

R3.Fundamentals of Digital Image Processing -A.K.Jain, PHI, 1989

R4.Digital Image Processing and Computer Vision -Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.

R6.Introduction to Image Processing Analysis - JohnC.Russ, J.Christian Russ, CRC

Press,2010 R7.Digital Image Processing with MATLAB &Labview -Vipula Singh, Elsevier.

WEB REFERENCES & E-BOOKS

W1. https://nptel.ac.in/courses/
W2. https://www.springer.com/in/book/
W3.http://onlinelibrary.wiley.com
W4.www.ieeexplore.ieee.org
W5.Digital image processing by Rafael C.Gonzalez (Ebook)

RESULT ANALYSIS TO IDENTIFY SLOW AND ADVANCED LEARNERS

Course Name: Digital Image Processing **Course Code:** EC713PE

Class: B.Tech- IV ECE – C **A.Y.:** 2022-23 **Semester:** I

Slow Learners (From III-II Result Analysis having >=3 backlogs) :

Total 18 slow learners are identified.

Remedial classes are held for improvement of slow learners.

Old and important questions are discussed more.

Home assignments are given regularly.

Counseling is provided regularly.

S.No	Roll Number	No.of Backlogs	MID-I Marks	MID-2 Marks
1	18X31A0403	5S	14	14
2	18X31A0413	5S	15	14
3	18X31A0454	5S	15	14
4	18X31A04D4	5S	15	14
5	18X31A04F1	5S	14	14
6	18X31A04H7	5S	15	14
7	19X31A04B0	3S	22	18
8	19X31A04B5	3S	20	15
9	19X31A04B7	5S	21	14
10	19X31A04C3	4S	22	14
11	19X31A04C7	4S	21	16
12	19X31A04D2	4S	17	15
13	19X31A04D3	5S	18	14
14	19X31A04D8	4S	19	14

15	19X31A04E2	4S	17	18
16	19X31A04E5	5S	14	15
17	20X35A0425	3S	20	22
18	20X35A0426	3S	18	16

Advanced Learners (From III-II Result Analysis having <=2 backlogs):

Total 40 advanced learners are identified.

S.No	Roll Number	Type of Support Provided
1	18X31A04H2	
2	19X31A04A1	
3	19X31A04A2	
4	19X31A04A3	
5	19X31A04A4	
6	19X31A04A5	
7	19X31A04A6	Advanced Concepts material is provided for advanced learners, Subject seminars are presented by advanced learners in the class., Advanced learners are encouraged to support slow learners.
8	19X31A04A7	
9	19X31A04A8	
10	19X31A04A9	
11	19X31A04B1	
12	19X31A04B2	
13	19X31A04B3	
14	19X31A04B4	
15	19X31A04B6	
16	19X31A04B8	
17	19X31A04B9	
18	19X31A04C0	
19	19X31A04C1	
20	19X31A04C2	

21	19X31A04C4
22	19X31A04C5
23	19X31A04C6
24	19X31A04C8
25	19X31A04C9
26	19X31A04D0
27	19X31A04D1
28	19X31A04D4
29	19X31A04D5
30	19X31A04D6
31	19X31A04D7
32	19X31A04D9
33	19X31A04E0
34	19X31A04E1
35	19X31A04E3
36	19X31A04E4
37	20X35A0421
38	20X35A0422
39	20X35A0423
40	20X35A0424

SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

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(Approved by AICTE, New Delhi and Affiliated to JNTUH, Hyderabad)
Khalsa Ibrahimpatnam, Sheriguda (V), Ibrahimpatnam (M), Ranga Reddy Dist., Telangana – 501 510
Website: https://siiet.ac.in/

BATCH ECE-IV BTECH I SEM ECE-C RESULT ANALYSIS

ACADAMIC YEAR/ SEMESTER	COURSE NAME	NUMBER OF STUDENTS		QUESTION PAPER SETTING		PASS %
		APPEARED	PASSED	INTERNAL	EXTERNAL	
2022-23 SEMESTER- I	Digital Image Processing	56	40	Course Faculty	JNTU Hyderabad	71.46%

Digital Image Processing
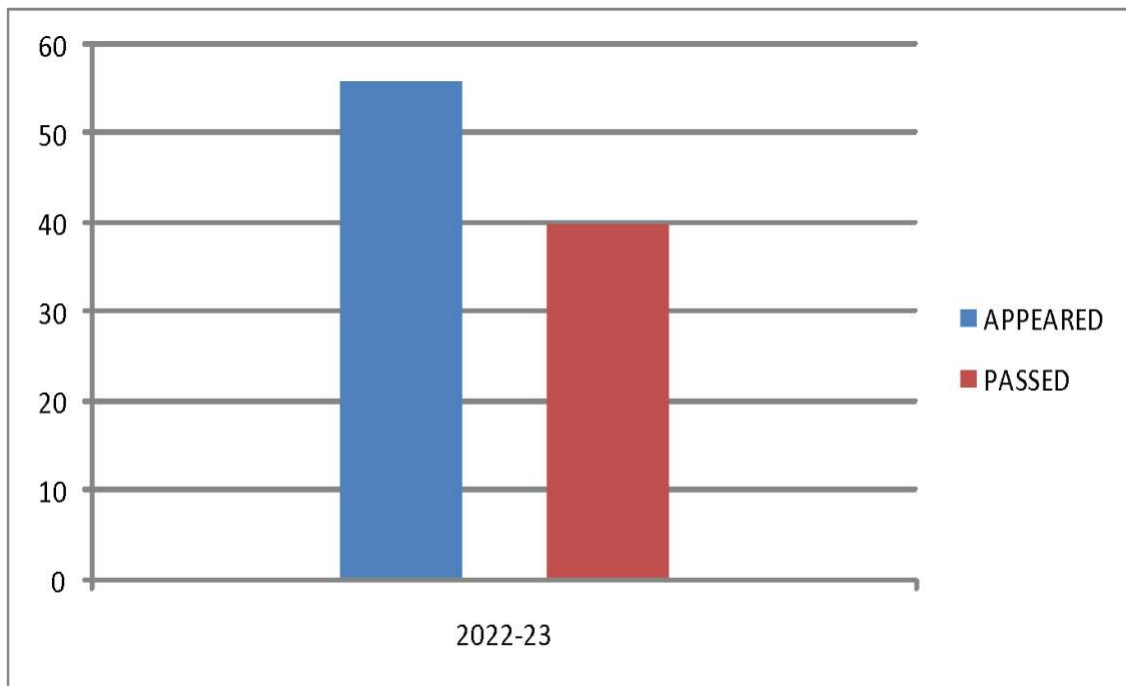
DEPARTMENT OF ELECTRONICS &C OMMUNICATION ENGINEERING

REMEDIAL CLASSES TIME TABLE

A.Y 2022-23   SEMESTER-I

BRANCH SEC	MON 4.00 PM-5.00 PM	TUE 4.00 PM-5.00 PM	WEB 4.00 PM-5.00 PM	THUR 4.00 PM•5.00 PM	FRI 4.00 PM-5.00 PM
II ECE-A	EDC	NATL	D5D	PTSP	ss
H ECE-B	NATL	DSD	PTSP	SS	EDI
III ECE-A	MPMC	DCCN	CS	BEFA	EMI
III ECE-B	DCCN	CS	BEFA	EMI	MPMC
III ECE-C	CS	BEFA	EMI	MPMC	DCCN
IV ECE-A	MW&OC	DIP	PPLE	NS&C	JAVA
IV ECE-B	DIP	PPLE	NS&C	JAVA	MW&OC
IV ECE-C	PPLE	NS&C	JAVA	MW&OC	DIP

Head of the Department
Electronics and Communication Engg. Dept
SRI INDU INSTITUTE OF ENGG & TECH,
..guda(V), Ibrahimpatnam(M),R.R.Dist-501 510.

PRINCIPAL
Sri Indu Institute of Engineering & Tech.
Sheriguda(Vill), Ibrahimpatnam,
R R Dist, Telangana -501 510.

SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electronics and Communication Engineering

Course Outcome Attainment (Internal Examination-1)

Name of the faculty : Dr.S.Anjaneyulu   Academic Year: 2022-23
Branch & Section: ECE - C   Examination: I Internal
Course Name: Digital image processing   Year: IV   Semester: I

S.No Max. Marks ==>	HT No.	Q1a	Q1b	Q2a	Q2b	Q3a	Q3b	Q4a	Q4b	Obj1	A1
		5		5		5		5		10	5
1	18X31A0403	2		2						5	5
2	18X31A0413	2								8	5
3	18X31A0454	2		3						5	5
4	18X31A04D4			2				2		5	5
5	18X31A04F1			2				3		4	5
6	18X31A04H2	5						4		7	5
7	18X31A04H7	1		3						6	5
8	19X31A04A1	2						2		5	5
9	19X31A04A2			5				4		8	5
10	19X31A04A3	4		5						9	5
11	19X31A04A4	4		4						9	5
12	19X31A04A5	5		4						9	5
13	19X31A04A6	5		5						9	5
14	19X31A04A7	5		5						9	5
15	19X31A04A8	5						4		8	5
16	19X31A04A9	5		2						8	5
17	19X31A04B0	5		2						8	5
18	19X31A04B1	5		5						8	5
19	19X31A04B2	5						1		8	5
20	19X31A04B3	5						4		7	5
21	19X31A04B4	5		5						9	5
22	19X31A04B5	5		2						8	5
23	19X31A04B6	5						5		7	5
24	19X31A04B7	5		1						9	5
25	19X31A04B8	3		4						7	5
26	19X31A04B9	5						4		9	5
27	19X31A04C0	2		5						9	5
28	19X31A04C1	4		5						7	5
29	19X31A04C2	4		5						8	5
30	19X31A04C3	5								8	5
31	19X31A04C4	4						5		8	5
32	19X31A04C5	4						4		8	5
33	19X31A04C6			3				2		4	5
34	19X31A04C7							4		8	5
35	19X31A04C8			5						8	5
36	19X31A04C9	5						3		7	5

No	Roll No										
37	19X31A04D0	5		5						8	5
38	19X31A04D1	5		5						7	5
39	19X31A04D2							1		8	5
40	19X31A04D3	5						4		7	5
41	19X31A04D4	5		5						8	5
42	19X31A04D5	4						4		7	5
43	19X31A04D6	4						4		9	5
44	19X31A04D7	4		5						8	5
45	19X31A04D8	4						4		8	5
46	19X31A04D9	4						4		8	5
47	19X31A04E0	5						5		7	5
48	19X31A04E1			5				5		8	5
49	19X31A04E2	3		5						8	5
50	19X31A04E3			5						8	5
51	19X31A04E4	4						4		8	5
52	19X31A04E5	5								7	5
53	20X35A0421			5						8	5
54	20X35A0422	4						4		8	5
55	20X35A0423			5				4		7	5
56	20X35A0424			5				5		8	5
57	20X35A0425	4		5						8	5
58	20X35A0426	4						5		7	5
Target set by the faculty / HoD		3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00	6.00	3.00
Number of students performed above the target		40	0	27	0	0	0	23	0	52	58
Number of students attempted		46	0	34	0	0	0	28	0	58	58
Percentage of students scored more than target		87%		79%				82%		90%	100%

CO Mapping with Exam Questions:

	CO - 1	Y		Y						Y	Y
	CO - 2					Y				Y	Y
	CO - 3							Y		Y	Y
	CO - 4										
	CO - 5										
	CO - 6										

% Students Scored >Target %		87%		79%				82%		90%	100%

CO Attainment based on Exam Questions:

	CO - 1	87%		79%						90%	100%
	CO - 2									90%	100%
	CO - 3							82%		90%	100%
	CO - 4										
	CO - 5										
	CO - 6										

CO	Subj	obj	Asgn	Overall	Level
CO-1	83%	90%	100%	91%	3.00
CO-2		90%	100%	95%	3.00
CO-3	82%	90%	100%	91%	3.00
CO-4					
CO-5					
CO-6					

Attainment Level	
1	40%
2	50%
3	60%

Attainment (Internal 1 Examination) = **3.00**

Faculty
Signature

SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electronics and Communication Engineering
Course Outcome Attainment (Internal Examination-2)

Name of the faculty : Dr.S.Anjaneyulu   Academic Year: 2022-23
Branch & Section: ECE - C   Examination: II Internal
Course Name: Digital image processing   Year: IV   Semester: I

S.No	HT No.	Q1a	Q1b	Q2a	Q2b	Q3a	Q3b	Q4a	Q4b	Obj4	A4
Max. Marks ==>		5		5		5		5		10	5
1	18X31A0403	3		3						6	5
2	18X31A0413	2								7	5
3	18X31A0454	1		3						5	5
4	18X31A04D4			2				3		6	5
5	18X31A04F1	2								8	5
6	18X31A04H2	4								8	5
7	18X31A04H7			4				4		7	5
8	19X31A04A1	5		4						9	5
9	19X31A04A2	4		4						7	5
10	19X31A04A3	5						4		8	5
11	19X31A04A4	4		4						7	5
12	19X31A04A5	5						4		7	5
13	19X31A04A6	5						5		8	5
14	19X31A04A7	5		4						8	5
15	19X31A04A8	4		5						8	5
16	19X31A04A9	5		5						8	5
17	19X31A04B0	5		4						9	5
18	19X31A04B1	5		5						6	5
19	19X31A04B2									8	5
20	19X31A04B3	5		4						8	5
21	19X31A04B4	4		4						8	5
22	19X31A04B5	5		5						6	5
23	19X31A04B6	5		4						5	5
24	19X31A04B7	4		4						8	5
25	19X31A04B8	4		3						7	5
26	19X31A04B9	5		5						7	5
27	19X31A04C0	5		4						8	5
28	19X31A04C1	5		5						8	5
29	19X31A04C2			5				4		8	5
30	19X31A04C3			2				3		5	5
31	19X31A04C4			5		4				9	5
32	19X31A04C5	4		5						8	5
33	19X31A04C6	4		5						9	5
34	19X31A04C7			5		1				9	5
35	19X31A04C8			5		5				8	5
36	19X31A04C9	5		5						9	5
37	19X31A04D0	5		5						6	5
38	19X31A04D1	5		4						7	5

No	Roll number										
39	19X31A04D2	5						3		7	5
40	19X31A04D3	5						4		8	5
41	19X31A04D4			5				5		9	5
42	19X31A04D5			5				4		8	5
43	19X31A04D6			5				4		9	5
44	19X31A04D7	5						4		9	5
45	19X31A04D8	5		3						9	5
46	19X31A04D9	5		4						8	5
47	19X31A04E0	5		5						8	5
48	19X31A04E1	5		5						9	5
49	19X31A04E2	4		5						8	5
50	19X31A04E3	4		5						8	5
51	19X31A04E4	5		4						8	5
52	19X31A04E5	4		5						8	5
53	20X35A0421	2		4						8	5
54	20X35A0422	5		4						8	5
55	20X35A0423	5		5						8	5
56	20X35A0424			5				5		9	5
57	20X35A0425			5				5		8	5
58	20X35A0426			4				4		8	5
	Target set by the faculty / HoD	3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00	6.00	3.00
	Number of students performed above the target	40	0	46	0	2	0	16	0	55	58
	Number of students attempted	44	0	48	0	3	0	16	0	58	58
	Percentage of students scored more than target	91%		96%		67%		100%		95%	100%

CO Mapping with Exam Questions:

CO - 1										
CO - 2										
CO - 3										
CO - 4	Y								Y	Y
CO - 5			Y						Y	Y
CO - 6					Y		Y		Y	Y

% Students Scored >Target %	91%		96%		67%		100%		95%	100%

CO Attainment based on Exam Questions:

CO - 1									
CO - 2									
CO - 3									
CO - 4	91%							95%	100%
CO - 5			96%					95%	100%
CO - 6					67%		100%	95%	100%

CO	Subj	obj	Asgn	Overall	Level
CO-1					
CO-2					
CO-3					
CO-4	91%	95%	100%	95%	3.00
CO-5	96%	95%	100%	97%	3.00
CO-6	83%	95%	100%	93%	3.00

Attainment Level	
1	40%
2	50%
3	60%

Attainment (Internal Examination-2) =   3.00

Faculty
Signature

INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electronics and Communication Engineering

Course Outcome Attainment (University Examinations)

Name of the faculty : Dr.S.Anjaneyulu Academic Year: 2022-23

Branch & Section: ECE - C Year / Semester: IV / I

Course Name: Digital image processing

S.No	Roll Number	Marks Secured	S.No	Roll Number	Marks Secured
1	18X31A0403	2	36	19X31A04C9	36
2	18X31A0413	1	37	19X31A04D0	36
3	18X31A0454		38	19X31A04D1	36
4	18X31A04D4		39	19X31A04D2	36
5	18X31A04F1	3	40	19X31A04D3	36
6	18X31A04H2	14	41	19X31A04D4	36
7	18X31A04H7	26	42	19X31A04D5	36
8	19X31A04A1	20	43	19X31A04D6	36
9	19X31A04A2	20	44	19X31A04D7	36
10	19X31A04A3	20	45	19X31A04D8	36
11	19X31A04A4	20	46	19X31A04D9	36
12	19X31A04A5	20	47	19X31A04E0	36
13	19X31A04A6	20	48	19X31A04E1	36
14	19X31A04A7	20	49	19X31A04E2	36
15	19X31A04A8	20	50	19X31A04E3	36
16	19X31A04A9	20	51	19X31A04E4	36
17	19X31A04B0	12	52	19X31A04E5	16
18	19X31A04B1	28	53	20X35A0421	36
19	19X31A04B2	18	54	20X35A0422	36
20	19X31A04B3	27	55	20X35A0423	36
21	19X31A04B4	30	56	20X35A0424	36
22	19X31A04B5	26	57	20X35A0425	36
23	19X31A04B6	40	58	20X35A0426	36
24	19X31A04B7	3	59		
25	19X31A04B8	42	60		
26	19X31A04B9	26	61		
27	19X31A04C0	26	62		
28	19X31A04C1	42	63		

29	19X31A04C2	26		64		
30	19X31A04C3	15		65		
31	19X31A04C4	34		66		
32	19X31A04C5	26		67		
33	19X31A04C6	28		68		
34	19X31A04C7	26		69		
35	19X31A04C8	26		70		

Max Marks	75

			Attainment Level	%Students
Class Average mark	26		1	40%
Number of students performed above the target	38		2	50%
Number of successful students	56		3	60%
Percentage of students scored more than target	68%			
Attainment level	**3**			

SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electronics and Communication Engineering
Course Outcome Attainment

Name of the faculty :	Dr.S.Anjaneyulu	Academic Year:	2022-23
Branch & Section:	ECE - C	Examination:	I Internal
Course Name:	Digital image processing	Year:	IV
		Semester:	I

Course Outcomes	1st Internal Exam	2nd Internal Exam	Internal Exam	University Exam	Attainment Level
CO1	3.00		3.00	3.00	3.00
CO2	3.00		3.00	3.00	3.00
CO3	3.00		3.00	3.00	3.00
CO4		3.00	3.00	3.00	3.00
CO5		3.00	3.00	3.00	3.00
CO6		3.00	3.00	3.00	3.00
Internal & University Attainment:			3.00	3.00	
Weightage			25%	75%	
CO Attainment for the course (Internal, University)			0.75	2.25	
CO Attainment for the course (Direct Method)			3.00		

Overall course attainment level   **3.00**

SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electronics and Communication Engineering
Course Outcome Attainment

Name of the faculty :	Dr.S.Anjaneyulu	Academic Year:	2022-23
Branch & Section:	ECE - C	Examination:	I Internal
Course Name:	Digital image processing	Year:	IV
		Semester:	I

Course Outcomes	1st Internal Exam	2nd Internal Exam	Internal Exam	University Exam	Attainment Level
CO1	3.00		3.00	3.00	3.00
CO2	3.00		3.00	3.00	3.00
CO3	3.00		3.00	3.00	3.00
CO4		3.00	3.00	3.00	3.00
CO5		3.00	3.00	3.00	3.00
CO6		3.00	3.00	3.00	3.00
Internal & University Attainment:			3.00	3.00	
Weightage			25%	75%	
CO Attainment for the course (Internal, University)			0.75	2.25	
CO Attainment for the course (Direct Method)			3.00		

Overall course attainment level   **3.00**

SRI INDU INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Electronics and Communication Engineering

Course Outcome Attainment

Name of Faculty:	Dr.S.Anjaneyulu	Academic Year:	2022-23
Branch & Section:	ECE-C	Year:	IV
Course Name:	Digital image processing	Semester:	I

CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2
CO1	2	2											2	2
CO2	3	2										3	2	2
CO3	3	2									2		2	2
CO4	2	2										2	3	3
CO5	3	2									2		3	3
CO6	3	2												
Course	**2.67**	**2.00**									**2.00**	**2.50**	**2.40**	**2.40**

CO	Course Outcome Attainment
CO1	3.00
CO2	3.00
CO3	3.00
CO4	3.00
CO5	3.00
CO6	3.00
Overall course attainment level	**3.00**

PO-ATTAINMENT

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2
CO Attainment	2.67	2.00									2.00	2.50	2.40	2.40

CO contribution to PO - 33%, 67%, 100% (Level 1/2/3)

Faculty Signature

Attendance Register

Course Name: Digital Image Processing

Course Code: EC713PE

Course Year/ Semester: B.Tech IV ECE – C Section

S.No	Attendance Register Link:
1	https://drive.google.com/file/d/1XgXm2ti6TWlf-EEysJyyT8DG3ru7SjaS/view?usp=drivesdk