



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore - 641 107



AN AUTONOMOUS INSTITUTION

Accredited by NBA - AICTE and Accredited by NAAC - UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

STAKEHOLDERS FEEDBACK - ACTION TAKEN REPORT - (2022-2023)

Department : Electronics and Communication Engineering

Sl. No.	Regulation for which feedback collected	Stakeholder	Name, Designation and Affiliation	Points Discussed	Action Taken	Implemented Year
1	2017	Student	Dinesh M I Year, Electronics and Communication Engineering, SNSCE	Shall include practical sessions for design of control systems, time and frequency response analysis.	MATLAB experiments are included in in the course 19EE402 - Control system Engineering	2022-23
2	2017	Student	Mohamed Ashfaq S II Year, Electronics and Communication Engineering, SNSCE	Interested to design new circuits and develop projects	Mini Project - III included in semester V for developing skills	2022-23
3	2017	Student	Jayaraman G II Year, Electronics and Communication Engineering, SNSCE	Include a new course to acquire knowledge for handling and working with new projects in IT industry..	The suggestion is considered and included as Open elective course 19OE104 - Software Project Management	2022-23
4	2017	Student	Abinaya. R II Year, Electronics and Communication Engineering, SNSCE	Interested to learn image processing techniques using open CV.	The preferred topic is included in the course 19EC513- Image Processing and Computer vision in unit V - Computer vision	2022-23
5	2017	Student	Sarvesh III Year, Electronics and Communication Engineering, SNSCE	Need training for development of communication, teamwork and problem solving.	The holistic growth shall be acquired in Career Course - Personal Psychology 19CC512.	2022-23
6	2017	Faculty	Dr.P.Gnanasundari HoD, Department of Electronics and Communication Engineering, SNSCE	A new course related with IoT with modern tools and technology can be added.	New course 19EC621 - IoT and Wireless Sensor Networks is added as a professional elective.	2022-23



7	2017	Faculty	Mrs.T.G.Ramabharathi AP, Department of Electronics and Communication Engineering, SNSCE	Add topics related to Applications of Embedded Systems	The suggestion is considered, a new Value Added Course -Industrial Applications based on Embedded Systems is included.	2022-23
8	2017	Faculty	Dr.A.Vaniprabha ASP, Department of Electronics and Communication Engineering, SNSCE	Propagation models, Cellular Architecture, RAKE Receiver can be included in Wireless Communication	Suggested topics are included in Unit II, Unit III, Unit IV in the course 19EC601 - Wireless Communication	2022-23
9	2017	Faculty	Mr.L.Mubaraali AP, Department of Electronics and Communication Engineering, SNSCE	Include advanced courses relevant to wireless communication	Millimeter Wave Technology course has offered as a Value Added Course.	2022-23
10	2017	Alumni	Mr. ArunPrasath R [Batch:2017 -2021] PumoTechnovation	Knowledge on Verilog can be included in the curriculum.	The suggested topic has been revised in the course 19EC505 - VLSI Design.	2022-23
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13	2017	Employer	Mr. Chetan Naidu Group Technical Manager HCL	Python, C can be offered to ECE students.	The following courses 19CS202 - Programming for Problem Solving using C and 19IT303 - Python Programming laboratory are offered	2022-23
14	2017	Employer	Mr. Sathish Kumar P HR & Admin Railsdata	Students shall study a course exclusively to understand and practice soft skills.	A new Value Added Course - Soft Skills is offered for the students.	2022-23
15	2017	Employer	Mr. Sridhar Reddy Performance Management Hexaware	Should improve Communication and interpersonal skill, and develop leadership quality	The course 19CC301 - Personality Development is included as Career course	2022-23



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DEPARTMENT OF ECE

EMPLOYERS FEEDBACK ON CURRICULUM

Name of the Industry: <u>Hexaware</u>	Name of the Employer: <u>Sridhar reddy</u>
Designation : <u>Performance management</u>	E-Mail : <u>Sridhar@Hexaware.com</u>
Location : <u>Chennai</u>	Contact Number : <u>-</u>

Please give your valuable feedback on curriculum to improve quality of the programme. Select your ranking on the scale of 0 to 4 for each of the following parameters.

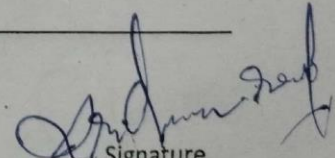
* Strongly Agree- 4, Agree-3, Partially Agree-2, Satisfactory- 1, Disagree-0

S.No	RUBRIC	4	3	2	1	0
1	Whether the Engineering graduate from SNSCE is competent enough to apply engineering techniques in their profession?	✓				
2	Whether the Engineering graduate from SNSCE has leadership skills to execute professional projects independently?		✓			
3	Do you feel the graduate from SNSCE is well prepared to be professional ethical & socially responsible engineer?			✓		
4	Do you feel the graduate from SNSCE has potential to pursue higher education for professional development?		✓			
5	The graduate from SNSCE is able to apply engineering fundamentals in their profession.		✓			
6	Do you feel the graduate from SNSCE is able to plan, organize & complete assigned task?		✓			
7	Whether the Engineering graduate from SNSCE is able to identify & solve the problems in multidisciplinary fields?	✓				
8	The graduate from SNSCE is aware of recent software tools & able to apply to solve engineering problems.		✓	✓		
9	The graduate from SNSCE is aware of importance of social & global aspects.	✓				
10	The graduate from SNSCE understands the impact of engineering solutions on society & aware of contemporary issues.		✓			

Suggestions if any for improvement:

enhancement of communication can be improved.

Date: 27/04/23


Signature



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19CC301	PERSONALITY DEVELOPMENT <i>[New]</i>	L	T	P	C
		0	0	4	2

Course Objective

- To understand about the personality self development for career
- To understand the concepts of body language for professional grooming
- To understand the communication and leadership qualities for professionalism
- To understand social imaging qualities for an interview
- To practice the personality development attributes for self assessment.

Course Outcome

- To evaluate the quality of personality for self development in career perspective.
- To apply the body languages in his professional interview modes.
- Apply the communication and leadership styles in the public speaking.
- Apply the social imaging qualities in their presentation skill.
- Demonstrate the personality development in mock interview.

UNIT-I	SELF-AWARENESS & PERSONAL DEVELOPMENT	6
Self Awareness: Key Areas - <u>Personality, Values, Habits, Needs & Emotions, Impact of Self Awareness on Personal Development</u>		
Personality - <u>Definition, Elements, Determinants, Needs and Benefits, Personality traits, Personality development skills, Positive traits for effective people, SWOT :Analyzing Strength and weakness (SWOT), Building Esteem & Self-Confidence, Working on attitudes (aggressive, assertive, submissive), Self Motivation</u>		
UNIT-II	BODY LANGUAGE	5
<u>Body Language-Postures and Gestures, Personal Grooming, Personal Hygiene, Social Effectiveness, Business Etiquettes, Interpersonal Relationship</u>		
UNIT-III	COMMUNICATION AND LEADERSHIP	8
Communication: <u>LRSW, Verbal & Non-Verbal Communication, Communication Barriers, Resume Building, Video Resume, Email writing, Presentation Skills, Self-Introduction, Extempore speech, Group Discussion, Mock Interview.</u>		
Leadership: <u>Leadership Styles, Leadership Traits, Group Dynamics, Team Building - Conflict management, Time Management, Stress management</u>		
UNIT-IV	SOCIAL IMAGE TRAITS	6
<u>Social etiquettes -Positive Social Image, Social Graces, Online Etiquettes, , Dinning Etiquettes, Public speaking, Voice Modulation, Telephone etiquettes, Interview etiquettes - Networking - Case Study and Company website References</u>		
UNIT-V	PERSONALITY TEST	5
<u>Big Five Personality Test, Open DISC Assessment Test</u>		

100%

New Subject 100%

Total: 30 PERIODS

P. Hemeshwar
Board Chairman



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TEXT BOOKS

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition: Prentice Hall.

REFERENCES

1. Smith, B . Body Language. Delhi: Rohan Book Company. 2004
2. Personality Development and Career management: By R.M.Onkar (S Chand Publications)

P. Venkatesh
Board Chairman



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DEPARTMENT OF Electronics and Communication Engg.

FACULTY FEEDBACK ON CURRICULUM

Department : <u>ECE</u>	Academic year: <u>2022-23</u>
Faculty Name: <u>Dr. A. Vaniprabha</u>	Year : <u>I/II/III/IV</u>
Course Code: <u>19EC601</u>	Course Name: <u>Wireless Communication</u>

Please give your valuable feedback on curriculum to improve quality of the programme. Select your ranking on the scale of 0 to 4 for each of the following parameters.

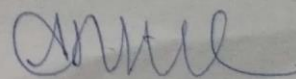
(Strongly Agree- 4, Agree-3, Partially Agree-2, Satisfactory- 1, Disagree-0)

Feedback on Curriculum		4	3	2	1	0
1	The allocation of the credits to the course is appropriate.	✓				
2	The depth of the course content is adequate to have significant learning outcomes.		✓			
3	Syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics.			✓		
4	The timely coverage of syllabus is possible in the mentioned number of hours.	✓				
5	The units/sections in the syllabus are properly sequenced.	✓				
6	The syllabus enable the students to improve the ability to formulate, analyze and solve problems.		✓			
7	Syllabus inculcated necessary ethical values and concern for the society.				✓	
8	The pre-requisite courses are appropriate for this course.		✓			
9	The course content satisfy the needs of follow-on courses.	✓				
Feedback on Laboratory component						
10	The designed experiments stimulate the interest of students in the subject and deepen their understanding through relating theory to practice(Experiential learning).	✓				
11	The practicals enable to develop experimental, design, problem solving and analysis skills of the students.	✓				

Recommendations for course improvement (Please specify topics that should be added/dropped from the course, changes in teaching scheme and experiments, etc. if any)

Include Cellular Architecture, RAKE
receiver.

Date: 19.4.2023


Signature of Faculty



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19EC601	WIRELESS COMMUNICATION	L	T	P	J	C
		3	0	0	0	3

COURSE OBJECTIVE	
1	Understand the basic principle of wireless communication
2	Analyze the various channel models and mobile radio
3	Expose the basic design of various cellular architectures
4	Understand the concept of multipath effects
5	Familiarize the recent IoT wireless technologies

UNIT I	FUNDAMENTALS OF WIRELESS COMMUNICATION	5 Hours
Evolution of cellular systems: 2G - 3G- 4G cellular networks- WLAN-PAN- Cellular concepts- Frequency reuse -Channel assignment- Handoff Strategies- Interference and system capacity, Trunking and Grade of Service, Improving Coverage and Capacity. Challenges of Wireless communication.		

3
10.

UNITII	MOBILE RADIO PROPAGATION	7 Hours
Free space propagation model, Three basic propagation mechanisms, Reflection-Two-Ray model, Diffraction – Knife-edge diffraction model, Scattering. Link budget design using path loss model- Log-normal shadowing. Small-scale multipath propagation- Parameters of mobile multipath channels- Types of small scale fading, Rayleigh and Rician distribution.		

13
13

UNITIII	CELLULAR NETWORKS	6 Hours
Cellular architecture: GSM- CDMA - GPRS-UMTS- 4G LTE-Intra-LTE mobility, Inter-RAT mobility, Mobility over X2 interface-OFDM- case study. 5G Networks and Devices- 5G Requirements- M2M Communications.		

10
11

UNIT IV	MULTIPATH MITIGATION TECHNIQUES	5 Hours
Equalization: Types of equalization -Linear and Non-Linear equalization, Adaptive Equalization- LMS,RLS Diversity Techniques: Selection combining, EGC, MRC, Feedback, Time, Frequency, RAKE Receiver.		

9
12.

UNIT V	WIRELESS ARCHITECTURES AND IOT WIRELESS TECHNOLOGIES	7 Hours
Wi-MAX -IEEE 802.16 - 4G LTE - LTE Advanced - IEEE 802.16e -IEEE 802.16m- 5G and advances Introduction to Short range communication, RFID, IrDA, NFC, GPS, Sigfox, NB-IoT, LoRA-WAN Protocol- Terminology, Classes of LoRA Devices, Frequency Bands, Addressing Schemes, Message/Frame Formats, Case study, Introduction to Firmware over the Air (FOTA).		

13
13.

TOTAL: 30 PERIODS

81.3

TEXT BOOKS

- Rappaport,T.S., "Wireless communications", Second Edition, Pearson Education, 2016.
- Andreas.F. Molisch, "Wireless Communications", John Wiley – India, 2011.

REFERENCES

- William Stallings, "Wireless Communication & Networking", Pearson Education Asia, 2009
- Schiller, "Mobile Communications", Pearson Education Asia Ltd., Reprint 2012
- R. Vannithamby and S. Talwar, Towards 5G: Applications, Requirements and Candidate Technologies., John Wiley & Sons, West Sussex, 2017.
- Jun Zheng, Abbas Jamalipour, "Wireless Sensor Networks: A Networking Perspective", Wiley India

Board Chairman



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	1 st Edition, 2014.
5.	David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005.
6.	http://nptel.ac.in/courses/117102062/37(38)
WEB RESOURCES	
1.	https://nptel.ac.in/courses/117104115
2.	https://nptel.ac.in/courses/106105166
3.	http://wireless.ictp.it/school_2015/presentations/

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Interpret the fundamentals of wireless communication networks and standards.

CO2: Analyze various channel models used in wireless communication.

CO3: Evaluate the functions of various cellular architectures

CO4: Appraise the suitable technology to mitigate the multipath effects

CO5: Distinguish and understand the recent IoT wireless technologies

Signature
18/12/2021
Board Chairman

% of change: 81.31%
81.31%

EC8652

WIRELESS COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To study the characteristic of wireless channel
- To understand the design of a cellular system
- To study the various digital signaling techniques and multipath mitigation techniques
- To understand the concepts of multiple antenna techniques

UNIT I WIRELESS CHANNELS 9

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-Coherence bandwidth – Doppler spread & Coherence time, fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

UNIT II CELLULAR ARCHITECTURE 9

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity-trunking & grade of service – Coverage and capacity improvement.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS 9

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV MULTIPATH MITIGATION TECHNIQUES 9

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver.

UNIT V MULTIPLE ANTENNA TECHNIQUES 9

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

TOTAL: 45 PERIODS

OUTCOMES:

The student should be able to:

- Characterize a wireless channel and evolve the system design specifications
- Design a cellular system based on resource availability and traffic demands
- Identify suitable signaling and multipath mitigation techniques for the wireless channel and system under consideration.

TEXT BOOKS:

1. Rappaport, T.S., —Wireless communicationsII, Pearson Education, Second Edition, 2010.(UNIT I, II, IV)
2. Andreas.F. Molisch, —Wireless CommunicationsII, John Wiley – India, 2006. (UNIT III,V)

REFERENCES:

1. Wireless Communication –Andrea Goldsmith, Cambridge University Press, 2011
2. Van Nee, R. and Ramji Prasad, —OFDM for wireless multimedia communications, Artech House, 2000
3. David Tse and Pramod Viswanath, —Fundamentals of Wireless Communication, Cambridge University Press, 2005.
4. Upena Dalal, —Wireless CommunicationII, Oxford University Press, 2009.



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DEPARTMENT OF ECE

STUDENT FEEDBACK ON CURRICULUM

Department : <u>ECE</u>	Academic year : <u>2022-2023</u>
Name of Student: <u>M. Dinesh</u>	Year : <u>I/II/III/IV</u>
Course Code : <u>19MA201</u>	Course Name : <u>fm1</u>

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(4 – Excellent 3 – Very Good 2 – Good 1 – Satisfactory 0 – Poor)

Feedback on Curriculum	4	3	2	1	0
1 The pre-requisite courses are appropriate for the course.		✓			
2 The allocation of the credits to the courses is appropriate in relation to the level of course work.		✓			
3 The depth of content in the courses is adequate in relation to the expected Course Outcomes (COs).	✓				
4 The units/sections in the syllabus are properly sequenced.		✓			
5 Syllabus equipped me with necessary technical skills to face the industry.			✓		
6 The syllabus enabled me to improve my ability to formulate, analyze and solve problems.		✓			
7 Syllabus inculcated necessary ethical values and concern for the society.			✓		
8 The electives offered are relevant to the technological advancements.			✓		
Feedback on Laboratory component					
9 The laboratory experiments enhanced my understanding of the concepts and enabled me to relate theory to practice (Experiential learning).		✓			

Recommendations for course improvement (Please specify topics that should be added/dropped from the course, changes in teaching scheme and experiments, etc. if any)

Good syllabus and also shall include practical sessions for design of control systems and frequency response analysis

Signature of Student

Date: 19.06.23



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19EE402	CONTROL SYSTEMS ENGINEERING	L	T	P	J	C
		3	0	2	0	3

Course Objectives

- To understand the methods of representation of systems and their desired transfer function models.
- To provide adequate knowledge in the time response of systems and steady state error analysis.
- To accord basic knowledge in obtaining the open loop and closed-loop frequency responses of systems.
- To Design a compensator and analyze the stability of a system using time domain and frequency domain specifications.
- To Understand the concepts of state variable model and to identify their controllability and observability.

UNIT-I SYSTEMS AND THEIR REPRESENTATION 9+3 Hours

Basic elements in control systems – Open and closed loop systems – Mathematical modeling of electrical and mechanical systems – Transfer function – Block diagram reduction techniques – Signal flow graphs.

MATLAB Implementation: Design of electrical and mechanical systems, MATLAB program to create transfer function.

4
8

UNIT-II TIME RESPONSE 9+3 Hours

Time response – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – P, PI, PID modes of feedback control.

MATLAB Implementation: Response of P, PI and PID controller for standard error input.

5
10

UNIT-III FREQUENCY RESPONSE 9+3 Hours

Frequency response – Bode plot – Polar plot – Determination of closed loop response from open loop response

MATLAB Implementation: Analysis of frequency response.

1
5

UNIT-IV STABILITY ANALYSIS 9+3 Hours

Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Nyquist stability criterion.

MATLAB Implementation: Analyzing stability condition using root locus.

5
2

UNIT-V COMPENSATOR DESIGN AND STATE SPACE ANALYSIS 9+3 Hours

Basic Compensators – Lag, lead and lag-lead networks – Lag / Lead compensator design using bode plots.

MATLAB Implementation: Design of compensators.

4
4

1. of change = 5090

Board Chairman

TOTAL: 45+15=60 Hours

501 new

16
32



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TEXT BOOKS	
1.	I.J. Nagrath and M. Gopal, „Control Systems Engineering“, New Age International Publishers, 2017.
2.	Benjamin C. Kuo, Automatic Control systems, Pearson Education, New Delhi, 2014.
REFERENCE BOOKS	
1.	K. Ogata, „Modern Control Engineering“, 4th edition, PHI, New Delhi, 2015
2.	Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi, 2007
3.	RamesC.Panda and T. Thyagarajan, “An Introduction to Process Modelling Identification and Control of Engineers”, Narosa Publishing House, 2017
4.	M. Gopal, „Control Systems, Principles and Design“, Tata McGraw Hill, New Delhi, 2012
5.	S N Deepa ,S N Sivanandam, Control systems Engineering using MATLAB -2E, Vikas Publishers
6.	Rao. V. Dukkupati, Analysis and design of control systems using MATLAB, New Age International Publishers, 2006.
WEB RESOURCES	
1.	www.pdf-search-engine.com/control-systems-pdf.html
2.	https://in.mathworks.com/products/control.html
3.	https://in.mathworks.com/products/control/code-examples.html
Course Outcomes (COs)	
1.	Understand the methods of representation of systems and their desired transfer function models.
2.	Identify and explain the type number and the order of the system and solve the steady state errors in the system.
3.	Construct bode plot, polar plot and root locus for the given system
4.	Design a compensator and analyze the stability of a system using time domain and frequency domain specifications.
5.	Understand the concepts of state variable model and to identify their controllability and observability.

[Signature]
(HOD/EEE)

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22/1/2021
Board Chairman

OBJECTIVES:

- To introduce the components and their representation of control systems
- To learn various methods for analyzing the time response, frequency response and stability of the systems.
- To learn the various approach for the state variable analysis.

UNIT I SYSTEMS COMPONENTS AND THEIR REPRESENTATION 9

Control System: Terminology and Basic Structure-Feed forward and Feedback control theory-Electrical and Mechanical Transfer Function Models-Block diagram Models-Signal flow graphs models-DC and AC servo Systems-Synchronous -Multivariable control system

UNIT II TIME RESPONSE ANALYSIS 9

Transient response-steady state response-Measures of performance of the standard first order and second order system-effect on an additional zero and an additional pole-steady error constant and system- type number-PID control-Analytical design for PD, PI, PID control systems

UNIT III FREQUENCY RESPONSE AND SYSTEM ANALYSIS 9

Closed loop frequency response-Performance specification in frequency domain-Frequency response of standard second order system- Bode Plot - Polar Plot- Nyquist plots-Design of compensators using Bode plots-Cascade lead compensation-Cascade lag compensation-Cascade lag-lead compensation

UNIT IV CONCEPTS OF STABILITY ANALYSIS 9

Concept of stability-Bounded - Input Bounded - Output stability-Routh stability criterion-Relative stability-Root locus concept-Guidelines for sketching root locus-Nyquist stability criterion.

UNIT V CONTROL SYSTEM ANALYSIS USING STATE VARIABLE METHODS 9

State variable representation-Conversion of state variable models to transfer functions-Conversion of transfer functions to state variable models-Solution of state equations-Concepts of Controllability and Observability-Stability of linear systems-Equivalence between transfer function and state variable representations-State variable analysis of digital control system-Digital control design using state feedback.

TOTAL:45 PERIODS**OUTCOMES:**

Upon completion of the course, the student should be able to:

- Identify the various control system components and their representations.
- Analyze the various time domain parameters.
- Analysis the various frequency response plots and its system.
- Apply the concepts of various system stability criterions.
- Design various transfer functions of digital control system using state variable models.

TEXT BOOK:

1. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 4th Edition, 2012.

REFERENCES:

1. J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2007.
2. K. Ogata, 'Modern Control Engineering', 5th edition, PHI, 2012.
3. S.K.Bhattacharya, Control System Engineering, 3rd Edition, Pearson, 2013.
4. Benjamin.C.Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition, 1995.



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DEPARTMENT OF ECE

STUDENT FEEDBACK ON CURRICULUM

Department :	<u>ECE</u>	Academic year :	<u>2022 - 2023</u>
Name of Student:	<u>Abinaya R</u>	Year :	<u>I/II/III/IV</u>
Course Code :	<u>19EE403</u>	Course Name :	<u>bsp</u>

Please give your valuable feedback on curriculum to improve quality of the programme. Select your ranking on the scale of 0 to 4 for each of the following parameters.

(4 – Excellent 3 – Very Good 2 – Good 1 – Satisfactory 0 – Poor)

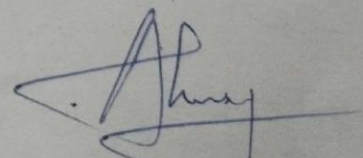
Feedback on Curriculum		4	3	2	1	0
1	The pre-requisite courses are appropriate for the course.	✓				
2	The allocation of the credits to the courses is appropriate in relation to the level of course work.		✓			
3	The depth of content in the courses is adequate in relation to the expected Course Outcomes (COs).	✓				
4	The units/sections in the syllabus are properly sequenced.		✓			
5	Syllabus equipped me with necessary technical skills to face the industry.		✓			
6	The syllabus enabled me to improve my ability to formulate, analyze and solve problems.			✓		
7	Syllabus inculcated necessary ethical values and concern for the society.	✓				
8	The electives offered are relevant to the technological advancements.		✓			
Feedback on Laboratory component		✓				
9	The laboratory experiments enhanced my understanding of the concepts and enabled me to relate theory to practice (Experiential learning).	✓				

Recommendations for course improvement (Please specify topics that should be added/dropped from the course, changes in teaching scheme and experiments, etc. if any)

Interested to learn more processing technique

based on computers

Date: 25.11.22


Signature of Student





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19EC513	IMAGE PROCESSING AND COMPUTER VISION	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

1	To learn the basics of digital image processing
2	To learn the processing involved in image enhancement and restoration
3	To explain the image compression and segmentation methods on digital images
4	To know the functions morphological image processing
5	To Explore the fundamentals of computer vision

UNIT-I DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS 9

Digital image processing system -Fundamental steps in digital image processing, Components of an image processing system, Structure of human eye, Image formation, Brightness adaptation and discrimination.

Basic concepts in sampling and Quantization, Representing digital images, Neighbors of a pixel, Adjacency, Connectivity, Regions and Boundaries, Distance Measures, A simple image formation mode.

Image transforms - Properties of 2D DFT, Discrete Cosine Transform, SVD transform, Wavelet transform.

12
20

UNIT-II IMAGE ENHANCEMENT AND RESTORATION 9

Image Enhancement: Histogram Processing- Histogram equalization, Matching, Local Histogram Processing, histogram statistics for image enhancement, smoothing linear filters, sharpening spatial filters.

Image Restoration: A model of image degradation/ restoration process, Noise models-Inverse filtering - Wiener filtering - Constrained least mean square filtering - Geometric transformation.

6
12

UNIT-III IMAGE COMPRESSION AND IMAGE SEGMENTATION 9

Image Compression: Need for compression - Huffman Coding, Arithmetic Coding, Run length coding, Lossy compression - Transform coding, Wavelet coding.

Image segmentation: Detection of isolated points, line detection, Edge models, Basic edge detection, Region based segmentation - region growing, Region splitting and merging.

6
14

UNIT-IV MORPHOLOGICAL IMAGE PROCESSING 9

Basic concept, Dilation and Erosion process for binary and gray image with applications, Opening & Closing for binary and gray image with applications, Hit-or-Miss Transformation, Basic Morphological Algorithms, Morphological reconstruction.

4
5

UNIT-V COMPUTER VISION 9

Introduction to computer vision- Image formation and Processing: Geometric primitives and transformations; Photometric image formation; The digital camera; Point Operators; Linear Filtering; Neighborhood Operators; Pyramids and Wavelets - Fourier Transforms; Geometric transformations- Applications of CV.

11
12

TOTAL: 45 PERIODS

TEXT BOOKS

- Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pearson, Third Edition, 2010. [Unit I-IV]
- Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer, 2010. [Unit V]

6
% of change $\frac{40}{65} \Rightarrow 61.5\%$

Board Chairman



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REFERENCES

1. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, "Digital Image Processing using MATLAB", Pearson Education, Inc., 2011.
2. Anil K. Jain, "Fundamentals of Digital Image Processing", Pearson, 2002.
3. William K. Pratt, "Digital Image Processing", John Wiley, New York, 2002.
4. Kenneth R. Castleman, "Digital Image Processing", Pearson, 2006.
5. Milan Sonka et al, "Image processing, analysis and machine vision", Brookes/Cole, Vikas Publishing House, 2nd edition, 1999.
6. "Computer Vision-A Modern Approach", Forsyth, Ponce, Low Price Edition, Pearson Education, January 2015.

WEB RESOURCES

1. <https://nptel.ac.in/courses/117105135>
2. <https://www.geeksforgeeks.org/>
3. <https://nptel.ac.in/courses/106105216>

COURSE OUTCOMES

At the end of the course students should be able to

- CO1:** Describe the basics and fundamentals of digital image processing and components
- CO2:** Design 2D filters and apply it for image enhancement and restoration
- CO3:** Apply image compression and segmentation methods on digital images
- CO4:** Develop the functions in morphological image processing
- CO5:** Analyze the fundamentals of computer vision and filtering operations.

Handwritten signature
17/7/2021
Board Chairman

OBJECTIVES:

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition methods

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION 9

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV IMAGE SEGMENTATION 9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V IMAGE COMPRESSION AND RECOGNITION 9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL :45 PERIODS**OUTCOMES:**

At the end of the course, the students should be able to:

- Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
- Operate on images using the techniques of smoothing, sharpening and enhancement.
- Understand the restoration concepts and filtering techniques.
- Learn the basics of segmentation, features extraction, compression and recognition methods for color models.