Vidyavardhini's College of Engineering & Technology

Founder President Late Padmashri H. G. Vartak

Approved by AICTE, DTE Maharashtra and Affiliated to University of Mumbai
NAAC accredited, 4 Programmes Accredited by NBA

Criteria Number: 2	**Criteria Name:** Teaching, Learning and Evaluation
Sub-criteria Number: 2.6	**Sub-criteria Name:** Student Performance and Learning Outcomes

2.6.2 Attainment of POs and COs are evaluated.

This document contains the samples for POs and COs Attainment. The documentary evidence can be accessed by clicking on the link given.

Supporting Documents

Sr. No.	Document	Link
1	Program Education objectives (PEOs) & Program specific outcomes (PSOs)	Supporting Document
2	Program outcomes (POs)	Supporting Document
3	Sample copy of Course objectives & course outcomes	Supporting Document
4	Sample of Mapping of course modules with course outcomes	Supporting Document
5	Sample of Mapping of course modules with Program outcomes & content delivery	Supporting Document
6	Sample copy of Assessment tools	Supporting Document
7	Sample copy of PO-PSO attainment calculation from CO attainment	Supporting Document
8	Sample copy of CO attainment Observations and Action Taken	Supporting Document
9	Sample copy of PO-PSO attainment Observations and Action Taken	Supporting Document

Vidyavardhini's
College of Engineering & Technology
Vasai Road (W)

Department of
Electronics and Telecommunication Engineering

Course Booklet (Theory)

Semester	IV	Class	SE
Course Code	ECC 405	Academic Year	2022-23
Course Name	Principles of Communication Engineering		
Name of Faculty	Dr. Amrita Ruperee		

Vidyavardhini's College of Engineering & Technology

Vision

To be a premier institution of technical education, aiming at becoming a valuable resource for industry and society.

Mission

- To provide technologically inspiring environment for learning.
- To promote creativity, innovation and professional activities.
- To inculcate ethical and moral values.
- To cater personal, professional and societal needs through quality education.

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Department Vision:

To contrive educational and research environment to serve industry and society needs in the field of electronics and telecommunication engineering.

Department Mission:

1. To enrich soft skills, ethical values, environmental and societal awareness.
2. To develop technical proficiency through projects and laboratory work.
3. To encourage students for lifelong learning through interaction with outside world.

Program Education Objectives (PEOs):

- The graduates will exhibit knowledge of mathematics, science, electronics, and communication, and will be able to apply the same in diversified field.
- The graduates will develop a habit of continuous learning while working in multidisciplinary environment.
- The graduates will grow as an individual with proficiency in technical skills, ethical values, communication skills, teamwork and professionalism.

Program Specific Outcomes (PSOs):

At the end of the program engineering graduate will be able to:

1. Apply the knowledge of Electronics and Communication to analyse, design and implement application specific problems with modern tools.
2. Adapt emerging technologies with continuous learning in the field of Electronics and Telecommunication engineering with appropriate solutions to real life problems.

3

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Program Outcomes (POs):

Engineering Graduates will be able to:

- **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, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

- **PO3. 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.

- **PO4. 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.

- **PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

- **PO6. 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.

- **PO7. 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.

- **PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- **PO9. Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- **PO10. 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, and give and receive clear instructions.

- **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 ability to engage in independent and life-long learning in the broadest context of technological change.

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Sr. No.	Content
1.	Syllabus
2.	Timetable
3.	Course Objectives and Course Outcomes
4.	Mapping of Course Modules with Course Outcomes
5.	Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes and Justification • Curriculum gaps identified
6.	Lesson Planning and Execution
7.	Attainment Tools, Performance Indicators for Assessment (Rubrics) and Quality of Evaluation
8.	Target for CO attainment levels and Qualifier levels for CO
9.	CO wise marks for In-semester and End semester and Result Analysis
10.	CO attainment through In-semester and End semester evaluation
11.	Details of activities beyond syllabus if any (seminar/guest lecture etc.)
12.	Attainment of COs, POs and PSOs
13.	Observations and Action Taken

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				Exam Duration (in Hrs.)	Term Work	Prac. & Oral	Total
		Internal assessment			End Sem. Exam				
		Test 1	Test 2	Avg. of Test 1 and Test 2					
ECC405	Principles of Communication Engineering	20	20	20	80	03	--	--	100

Course Pre-requisite:

1. ECC301 - Engineering Mathematics- III
2. ECC302 - Electronic Devices and Circuits

Course Objectives:

1. To illustrate the fundamentals of basic communication system.
2. To understand various analog modulation and demodulation techniques.
3. To focus on applications of analog modulation and demodulation techniques.
4. To explain the key concepts of analog and digital pulse modulation and demodulation techniques.

Course Outcomes:

After successful completion of the course student will be able to:

1. Understand the basic components and types of noises in communication system.
2. Analyze the concepts of amplitude modulation and demodulation.
3. Analyze the concepts of angle modulation and demodulation.
4. Compare the performance of AM and FM receivers.
5. Describe analog and digital pulse modulation techniques.
6. Illustrate the principles of multiplexing and demultiplexing techniques.

6

Module No.	Unit No.	Topics	Hours
1		**Basics of Communication System**	05
	1.1	Block diagram, electromagnetic spectrum, signal bandwidth and power, types of communication channels, Introduction to time and frequency domain. Basic concepts of wave propagation.	03
	1.2	Types of noise, signal to noise ratio, noise figure, noise temperature and Friss formula.	02
2		**Amplitude Modulation and Demodulation**	12
	2.1	Basic concepts, need for modulation, waveforms (time domain and frequency domain), modulation index, bandwidth, voltage distribution and power calculations.	04
	2.2	DSBFC: Principles, low-level and high-level transmitters, DSB suppressed carrier, Balanced modulators with diode (Ring modulator and FET) and SSB systems.	04
	2.3	Amplitude demodulation: Diode detector, practical diode detector, Comparison of different AM techniques, Applications of AM and use of VSB in broadcast television.	04
3		**Angle Modulation and Demodulation**	10
	3.1	Frequency and Phase modulation (FM and PM): Basic concepts, mathematical analysis, FM wave (time and frequency domain), sensitivity, phase and frequency deviation, modulation index, deviation ratio, bandwidth requirement of angle modulated waves, narrowband FM and wideband FM.	04
	3.2	Varactor diode modulator, FET reactance modulator, stabilized AFC, Direct FM transmitter, indirect FM Transmitter, noise triangle, pre- emphasis and de-emphasis	03
	3.3	FM demodulation: Balanced slope detector, Foster-Seely discriminator, Ratio detector, FM demodulator using Phase lock loop, amplitude limiting and thresholding, Applications of FM and PM.	03
4		**Radio Receivers**	04
	4.1	Characteristics of radio receivers, TRF, Super - heterodyne receiver block diagram, tracking and choice of IF, AGC and its types and Communication receiver.	03
	4.2	FM receiver block diagram, comparison with AM receiver.	01
5		**Analog and Digital Pulse Modulation & Demodulation**	06
	5.1	Sampling theorem for low pass signal, proof with spectrum, Nyquist criteria, Sampling techniques, aliasing error and aperture effect.	03
	5.2	PAM, PWM, PPM generation, detection and applications. Basics of PCM system and differential PCM system. Concepts of Delta modulation (DM) and Adaptive Delta Modulation (ADM).	03
6		**Multiplexing & De-multiplexing**	02
	6.1	Frequency Division Multiplexing transmitter & receiver block diagram and applications. Time Division Multiplexing transmitter & receiver block diagram and applications.	02
		Total	39

Textbooks:

1. Kennedy and Davis, "Electronics Communication System", Tata McGraw Hill, Fourth edition.
2. B.P. Lathi, Zhi Ding "Modern Digital and Analog Communication system", Oxford University Press, Fourth edition.
3. Wayne Tomasi, "Electronics Communication Systems", Pearson education, Fifth edition.

Reference Books:

1. Taub, Schilling and Saha, "Taub's Principles of Communication systems", Tata McGraw Hill, Third edition.
2. P. Sing and S.D. Sapre, "Communication Systems: Analog and Digital", Tata McGraw Hill, Third edition.
3. Simon Haykin, Michel Moher, "Introduction to Analog and Digital Communication", Wiley, Second edition.
4. Dennis Roddy and John Coolen, Electronic Communication, Pearson, 4/e, 2011.
5. Louis Frenzel, "Communication Electronics", Tata McGraw Hill, Third Edition.

NPTEL/ Swayam Course:

1. Course: Analog Communication By Prof. Goutam Das (IIT Kharagpur);
   https://swayam.gov.in/nd1_noc20_ee69/preview

Internal Assessment (20-Marks):

Internal Assessment (IA) consists of two class tests of 20 marks each. IA-1 is to be conducted on approximately 40% of the syllabus completed and IA-2 will be based on remaining contents (approximately 40% syllabus but excluding contents covered in IA-I). Duration of each test shall be one hour. Average of the two tests will be considered as IA marks.

End Semester Examination (80-Marks):

Weightage to each of the modules in end-semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of **total 06** questions, each carrying **20 marks**.
2. **Question No: 01** will be **compulsory** and based on entire syllabus wherein 4 to 5 sub-questions will be asked.
3. Remaining questions will be mixed in nature and randomly selected from all the modules.
4. Weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.
5. **Total 04 questions** need to be solved.

8

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Vidyavardhini's College of Engineering & Technology
Department Of Electronics & Telecommunication Engineering
ACADEMIC YEAR 2022-23 (EVEN SEMESTER)
TimeTable Effective From 16th Jan 2023
Term From 2nd Jan 2023 to 23rd April 2023

SEMESTER : IV / SE   Class Room No: 425

TIME / DAY	9:00 TO 10:00	10:00 TO 11:00	11:00-11:15	11:15 TO 12:15	12:15 TO 1:15	1:15 TO 2:00	2:00 TO 3:00	3:00 TO 4:00	4:00 TO 5:00	5:00 To 6:00
MONDAY	Pcom (A) T.S / LIC(B) S.J / Microcontroler(C) S.K / Skill Lab (D) I	Maths(A) M.G / S.S (A) V.G / Skill Lab (B) S.K / LIC(C) S.S / Pcom (D) A.R	B R E A K	POM	EM-IV	L U N C H	uC	LIC(T.S)	Proctor	
TUESDAY	PCOM	S.S		PCOM	SS	B R E A K	LIC S.S	EM-IV		
WEDNESDAY	PCOM	SS		LIC(A) S.J / Microcontroler(B) S.K / Skill Lab (C) / Maths(D) M.G / S.S (D) V.G / Microcontroler(A) S.K / Maths(B) M.G / S.S (b) V.G / Pcom (C) A.R / LIC(D) S.S			Skill Lab	SS	Mini Project	
THURSDAY	EM-IV	uC					SS	uC	Mini Project	
FRIDAY	Skill Lab	LIC(T.S)		LIC(S.S)			PCOM	Skill Lab (A) S.P / Pcom (B) A.R / Maths(C) M.G / S.S (C) V.G / Microcontroler(D) S.K		

Subject	Name Of Faculty
Signals & Systems	Dr. Vikas Gupta
Principles of Communication	Dr. Amrita Ruperee
Microcontroller	Ms. Shaishta Khanam
Skill Lab	Ms. Shaishta Khanam
Linear Integrated Circuits	Ms. S. Supalkar (class (I/C)
Engineering Mathematics-IV	Mr. Mayur Gohil

Lab Name	Room No
LIC	407
Pcom	402
Skill Lab	410
Microcontroler	401
AM-IV/S.S (Tut)	317

Ms. Neha Gharat
Time Table Incharge

Dr. Sushsuma Jadhav
Academic Incharge

Dr. Amrita Ruperee
HOD-EXTC

Dr. Vikas Gupta
Dean Academics

Dr. H. Vankudre
Principal

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Course Objectives

1	To illustrate the fundamentals of basic communication system.
2	To understand various analog modulation and demodulation techniques
3	To focus on applications of analog modulation and demodulation techniques.
4	To explain the key concepts of analog and digital pulse modulation and demodulation techniques.

Course Outcomes

At the end of the course student will be able to:		Action verb	CL
ECC405.1	Explain basic components and types of noise in communication system	**Explain**	Level 2
ECC405.2	Analyse the concepts of Amplitude Modulation and Demodulation techniques.	**Analyse**	Level 4
ECC405.3	Analyse the concepts of Angle Modulation and Demodulation techniques.	**Analyse**	Level 4
ECC405.4	Illustrate the performance of AM and FM receivers.	**Illustrate**	Level 3
ECC405.5	Describe analog and digital pulse modulation and demodulation techniques	**Describe**	Level 2
ECC405.6	Explain the principles of multiplexing and demultiplexing techniques	**Explain**	Level 2

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Mapping of Course Modules with Course Outcomes

Course Modules	Course Outcomes					
	ECC405.1	ECC405.2	ECC405.3	ECC405.4	ECC405.5	ECC405.6
Basics of communication system	3	-	-	-	-	-
Amplitude Modulation and Demodulation	-	3	-	-	-	-
Angle Modulation and Demodulation	-	-	3	-	-	-
Radio receiver	-	-	-	3	-	-
Analog and digital pulse modulation and demodulation	-	-	-	-	3	-
Multiplexing and De-multiplexing	-	-	-	-	-	3

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECC405.1	2	-	-	-	-	-	-	2	2	2	-	-	2	-
ECC405.2	3	2	-	-	-	-	-	2	2	2	-	-	2	-
ECC405.3	3	2	-	-	-	-	-	2	2	2	-	-	2	-
ECC405.4	3	1	-	-	-	-	-	2	2	2	-	2	2	-
ECC405.5	2	-	-	-	-	-	-	1	1	1	-	-	2	2
ECC405.6	2	-	-	-	-	-	-	1	1	1	-	-	2	2
Average	2.5	1.66	-	-	-	-	-	1.67	1.67	1.67	-	-	2	2
Rounded Avg.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**	**-**	**-**	**2**	**2**

Enter correlation level 1, 2 or 3 as defined below

1: Slight (Low)   2: Moderate (Medium)   3: Substantial (High)

If there is no correlation put "—".

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

CO-PO Mapping Justification:

CO	PO	Level of mapping	Justification
CO1	PO1	2	• Students will be able to identify Radio frequency spectrum with their applications. • Able to explain types of communication systems, components of communication, and types of noise. • Need knowledge of mathematics and electronic circuits and **apply** this knowledge to observe the effect of noise on communication systems. Hence marked as level 3
	PO8	2	• The rubric of the assignment is given to the student has assigned marks for originality and timely submission. • The rubric of the quiz is given to the student has assigned marks for correct answers and timely submission. Hence, marked as level 2
	PO9	2	• The individual performance is assessed in the assignments by giving separate assignments to each student and Quiz and oral questions/ answers in class. Hence, marked as level 2
	PO10	2	• There are regular question/ answer sessions in the class which reflect the oral communication ability of the students. • The rubric of the assignment given to the student has assigned marks for quality, originality and presentation of written contents. Hence, marked as level 2.
CO2	PO1	3	• The students will be able to explain various AM modulation and demodulation techniques and derive the modulated wave equation, **apply** this concept to calculate the parameters such as power requirement, BW etc. Hence marked as level 3.
	PO2	2	• The students will be able to **compare** various AM systems such as DSBFC, DSBSC, SSBSC, SSBRC, ISB, based on their BW, Power requirement, complexity etc.
	PO8	2	• The rubric of the assignment is given to the student has assigned marks for originality and timely submission. • The rubric of the quiz is given to the student has assigned marks for correct answer and timely submission. Hence, marked as level 2
	PO9	2	• Individual performance is assessed in the assignments by giving separate assignments to each student and Quiz and oral questions/ answers in class. Hence, marked as level 2
	PO10	2	• There are regular question/ answer sessions in the class which reflect the oral communication ability of the students.

CO	PO		
			• The rubric of the assignment given to the student has assigned marks for quality, originality, and presentation of written contents. Hence, marked as level 2.
CO3	PO1	3	• The students will be able to explain various FM and PM modulation and demodulation techniques. • Derive the modulated wave equation and apply this concept to calculate parameters such as power requirement, BW, % modulation etc. Hence marked as level 3
	PO2	2	• The students will be able to differentiate types of FM systems such as Narrow band and wide band based on BW, power requirement, modulation index, frequency deviation, applications etc. • The students will be able to Compare FM and PM system. Hence marked as level 2
	PO8	2	• The rubric of the assignment is given to the student has assigned marks for originality and timely submission. • The rubric of the quiz is given to the student has assigned marks for correct answer and timely submission. Hence, marked as level 2
	PO9	2	• Individual performance is assessed in the assignments by giving separate assignments to each student and Quiz and oral questions/ answers in class. Hence, marked as level 2
	PO10	2	• There are regular question/ answer sessions in the class which reflect the oral communication ability of the students. • The rubric of the assignment given to the student has assigned marks for quality, originality and presentation of written contents. Hence, marked as level 2.
CO4	PO1	3	• The students will be able to explain types of radio receivers and the characteristics of radio receivers. Hence marked as level 3
	PO2	1	• The students will be able to compare the performance of AM and FM radio receivers based on BW, effect of noise, circuit complexity and so on. Hence marked as level 1.
	PO8	2	• The rubric of the assignment is given to the student has assigned marks for originality and timely submission. • The rubric of the quiz is given to the student has assigned marks for correct answer and timely submission. Hence, marked as level 2
	PO9	2	• Individual performance is assessed in the assignments by giving separate assignments to each student and Quiz and oral questions/ answers in class. Hence, marked as level 2
	PO10	2	• There are regular question/ answer sessions in the class which reflect the oral communication ability of the students. • The rubric of the assignment given to the student has assigned marks for quality, originality and presentation of written contents. Hence, marked as level 2.

	PO12	2	• The students will be able to explain applications of AM and FM system in 1G mobile system, TV and military with independent learning (self-learning). Hence, marked as level 2.
CO5	PO1	2	• The students will be able to explain sampling theorem. • Analog pulse modulation/ demodulation and • Working principle of Pulse Code Modulation, DM and ADM with their applications. Hence marked as level 2.
	PO8	1	• The rubric of the quiz is given to the student has assigned marks for correct answer and timely submission. Hence, marked as level 1
	PO9	1	• The individual performance is assessed in the Quiz and oral questions/ answers in class. Hence, marked as level 1
	PO10	1	• There are regular question/ answer sessions in the class which reflect the oral communication ability of the students. • The rubric of the quiz is given to the student has assigned marks for correct answer and timely submission. Hence, marked as level 1.
CO6	PO1	2	• The students will be able to explain the need for multiplexing. • Working principle of FDM and TDM and applications. Hence marked as level 2.
	PO8	1	• The rubric of the quiz is given to the student has assigned marks for correct answer and timely submission. Hence, marked as level 1
	PO9	1	• The individual performance is assessed in Quiz and oral questions/ answers in class. Hence, marked as level 1
	PO10	1	• There are regular question/ answer sessions in the class which reflect the oral communication ability of the students. • The rubric of the quiz is given to the student has assigned marks for correct answer and timely submission. Hence, marked as level 1.

CO-PSO Mapping Justification:

CO	PSO	Level of mapping	Justification
CO1	PSO1	2	The students will be able to explain fundamentals of communication system, significance of noise and its effect on communication system
CO2	PSO1	2	The students will be able to analyze various AM systems and able to design AM systems for the given carrier frequency. Hence marked as level 2.
CO3	PSO1	2	The students will be able to analyze various Angle modulation systems and design systems for the given carrier frequency and frequency deviation. Hence marked as level 2.

CO4	PSO1	2	The students will be able to design the radio receiver for given carrier frequency by applying the knowledge of radio circuit design and analyze performance of AM and FM receiver. Hence marked as level 2.
CO5	PSO1	2	The students will be able to explain various sampling techniques, pulse analog modulation system, PCM. And able to design sampling circuits, PCM, pulse analog modulation circuit as per requirement. Hence marked as level 2.
	PSO2	2	The knowledge gained in this course can be applied for understanding new technologies and developing solutions to real life problems. Hence marked as level 2.
CO6	PSO1	2	The students will be able to explain multiplexing techniques used in various applications. Hence marked as level 2.
	PSO2	2	The knowledge gained in this course can be applied for understanding new technologies and developing solutions to real life problems. Hence marked as level 2.

- **Visit to All India Radio (Content beyond the syllabus)**

Modes of Content Delivery:

i	Classroom Teaching	vi	Slides/Handouts/Notes
ii	Tutorial/Assignment	vii	Simulations/Demonstrations
iii	Lab Experiment	viii	Seminar
iv	Self-Learning Online Resources	ix	ICT tools used
v	Industry visit	x	

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Lesson plan

Lect. No.	Topic	Planned date (dd/mm/yy)	Mode of Content Delivery	Assessment Method
1	**Pre-requisite:** Basics of amplifier, filter, oscillator, BW, time, and frequency domain representation of signal	9/1/23	i, vi	
M-1	**Basics of Communication System**			Quiz
2	Block diagram, Frequency spectrum and their application, types of communication systems, types of channels.	10/1/23	i, vi, ix	
3	Noise, types of noise	11/1/23	i, vi, ix	
4	Noise figure, noise factor and Friiss formula	12/1/23	i, vi, ix	Assignment
5	Problems on Noise	16/1/23	i, ii, vi, ix	
M-2	**Amplitude Modulation and Demodulation**			Quiz
6	Modulation, need of modulation and, AM modulation, mathematical analysis	17/1/23	i, iii, vi, ix	
7	AM waveform (DSBFC) for M>1, M<1 and M=1 in time and frequency domain, BW.	18/1/23	i, iii, vi, ix	
8	Power calculation equation.	20/1/23	i, vi, ix	
9	Problems on AM and power calculation	23/1/23	i, ii, vi, ix	Assignment
10	High level and low-level Tx	24/1/23	i, iii, vi, ix	
11	DSBSC principle, FET modulator and Ring Modulator	25/1/23	i, vi, ix	

12	SSB generation methods	27/1/23	i, vi, ix	
13	Diode detector, practical diode detector and Comparison of different AM techniques	30/1/23	i, iii, vi, ix	
14	Principle of VSB and Communication receiver	31/1/23	i, vi, ix	
M3	**Frequency Modulation and Demodulation**			Quiz
15	FM and PM modulation, mathematical analysis and waveform	1/2/23	i, iii, vi, ix	
16	Sensitivity, frequency deviation, modulation index and BW, Narrow band and wide band FM	3/2/23	i, ii, vi, ix	Assignment
17	Problems on FM and power calculation	6/2/23	i, ii, vi, ix	Assignment
18	FM generation – Direct method (varactor diode) and FET reactance modulator	13/2/23	i, iii, vi, ix	
19	Direct FM transmitter with AFC	14/2/23	i, vi, ix	
20	Indirect FM transmitter and design problems	15/2/23	i, vi, ix	
21	Noise triangle, Pre emphasis and De emphasis	17/2/23	i, iii, vi, ix	
22	FM demodulation, balanced slope detector and Foster Seely discriminator	20/2/23	i, iii, iv, vi, ix	
23	Ratio detector, Demodulator with PLL	21/2/23	i, iii, vi, ix	
M4	**Radio Receiver**			Quiz
24	Characteristics of radio receiver, Principle of TRF	27/2/23	i, vi, ix	
25	Super heterodyne receiver block diagram	28/2/23	i, iii, vi, ix	

26	Super heterodyne receiver block diagram waveforms and design problems.	6/3/23	i, iii, vi, ix	Assignment
27	Tracking and Choice of IF, image frequency, AGC and types of AGC	8/3/23	i, ii, vi, ix	
28	FM radio receiver block diagram	13/3/23	i, iii, vi, ix	
29	Amplitude limiting, Comparison of AM, FM and PM, VSB	14/3/23	i, vi, ix	
M5	**Analog and Digital Pulse Modulation & Demodulation**			Quiz
30	Sampling theorem for low pass signal with spectrum	15/3/23	i, iii, vi, vii, ix	
31	Nyquist criteria, aliasing error, PAM generation and detection	20/3/23	i, iii, vi, vii, ix	
32	PWM and PPM generation and detection and applications	21/3/23	i, iii, vi, ix	
33	PAM, PWM, PPM Comparison	24/3/23	i, vi, ix	
34	Basic concept of PCM (block diagram)	27/3/23	i, vi, ix	
35	Quantization and Encoder	28/3/23	i, vi, ix	
36	Delta and Adaptive Delta Modulation.	29/3/23	i, vi, ix	
	Industrial Visit to All India Radio (Akashwani)	31/3/23	v	
M6	**Multiplexing and Demultiplexing**			Quiz
37	FDM transmitter/ Receiver and applications	1/4//23	i, vi, ix	
38	TDM transmitter/ Receiver and applications	3/4/23	i, iii, vi, ix	

Lesson Execution

Lect. No.	Topic	Execution date	Remarks
	Pre-requisite: Basics of amplifier, filter, oscillator, BW, time, and frequency domain representation of signal	9/1/23	
M1	**Basics of Communication System**		
1	Block diagram, Frequency spectrum and their application, types of communication systems, types of channels.	10/1/23	
2	Noise, types of noise	12/1/23	
3	Noise figure, noise factor and Friiss formula	16/1/23	
4	Problems on Noise	17/1/23	
M2	**Amplitude Modulation and Demodulation**		
5	Modulation, need of modulation and, AM modulation, mathematical analysis	18/1/23	
6	AM waveform (DSBFC) for M>1, M<1 and M=1 in time and frequency domain, BW.	19/1/23	Adjusted with Dr. Gupta
7	Power calculation equation.	23/1/23	
8	Problems on AM and power calculation	24/1/23	
9	High level and low-level transmitter	25/1/23	
10	DSBSC principle, FET modulator and Ring Modulator	27/1/23	Extra lecture
11	SSB generation methods	30/1/23	
12	Diode detector, practical diode detector and Comparison of different AM techniques	31/1/23	
13	Principle of VSB and Communivation receiver	1/2/23	
M3	**Frequency Modulation and Demodulation**		

14	FM and PM modulation, mathematical analysis and waveform	4/2/23	Adjusted with Mr. Mayur Gohil
15	Sensitivity, frequency deviation, modulation index and BW, Narrow band and wide band FM	13/2/23	
16	Problems on FM and power calculation	14/2/23	
17	FM generation – Direct method (varactor diode) and FET reactance modulator	15/2/23	
18	Direct FM transmitter with AFC	17/2/23	
19	Indirect FM transmitter and design problems	20/2/23	
20	Noise triangle, Pre emphasis and De emphasis	21/2/23	
21	FM demodulation, balanced slope detector and Foster Seely discriminator	23/2/23	Adjusted with Dr. Gupta
22	Ratio detector, Demodulator with PLL	28/2/23	
M4	**Radio Receiver**		
23	Characteristics of radio receiver, Principle of TRF	6/3/23	
24	Super heterodyne receiver block diagram	8/3/23	
25	Super heterodyne receiver block diagram waveforms and design problems.	13/3/23	
26	Tracking and Choice of IF, image frequency, AGC and types of AGC	14/3/23	
27	FM radio receiver block diagram explanation	15/3/23	
28	Amplitude limiting, Comparison of AM, FM and PM, VSB	20/3/23	
M5	**Analog and Digital Pulse Modulation & Demodulation**		
29	Sampling theorem for low pass signal with spectrum	21/3/23	
30	Nyquist criteria, aliasing error, PAM generation and detection	24/3/23	
31	PWM and PPM generation and detection and applications	24/3/23	Adjusted with Mr. Mayur Gohil

	Industrial Visit to All India Radio (Akashwani)	10/3/23	Got permission for visit on this date.
32	Basic concept of PCM (block diagram)	28/3/23	
33	Quantization and Encoder	29/3/23	
34	Delta modulation and Adaptive Delta Modulation.	1/4/23	
M6	**Multiplexing and Demultiplexing**		
35	FDM transmitter/ Receiver and applications	4/4/23	
36	TDM transmitter/ Receiver and applications	5/4/23	

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Performance Indicators for assessing Course Outcomes: Assignments/ Tutorials:

Performance Indicator	Exceed Expectations (EE)	Meet Expectations (ME)	Below Expectations (BE)
Legibility (4)	*Very neat. Writing illustrates a lot of thought and preparation, grammatical errors.*	*Mostly neat Writing illustrates some thought and preparation, grammatical errors.*	*Not legible. Ideas expressed are difficult to understand, grammatical errors.*
Demonstrated Knowledge (4)	*Complete understanding of the questions, mathematical ideas, and processes.*	*Considerable understanding of the problem, ideas, and processes.*	*Lack of understanding for the problem.*
Timely submission (2)	*Submission before deadline specified.*	*Submission on deadline.*	*Submission after deadline.*

Analysis of last year University Exam Question Paper

	Learning Level (Marks)					
	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
CO1	7M					
CO2	6M	15M	5M			
CO3	2M	10M	2M			
CO4	4M	15M	2M			
CO5	2M	25M				
CO6		10M	5M			

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Plan of Evaluation

CO	Method of evaluation	Learning Level					
		Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
CO1	IA		15%	10%			
	Quizzes	50%		50%			
	Assignments			100%			
CO2	IA		10%	40%			
	Quizzes	20%	20%	60%			
	Assignments			80%	20%		
CO3	IA		10%	20%			
	Quizzes	30%	40%	30%			
	Assignments						
CO4	IA		30%	10%			
	Quizzes	40%	20%	40%			
	Assignments			100%			
CO5	IA		20%	10%			
	Quizzes	30%	30%	40%			
	Assignments						
CO6	IA		25%				
	Quizzes	70%	20%	10%			
	Assignments						

Enter correlation level 1, 2 or 3 as defined below

1: Slight (Low)   2: Moderate (Medium)   3: Substantial (High)

If there is no correlation put '—'.

Target for CO attainment levels:

CO	Previous year Target level	Is the CO attained in the previous year? (Y/N)	Is target reached 3.0?	Revised target
ECC405.1	1.8	Y	N	**2.0**
ECC405.2	1.8	Y	N	**2.0**
ECC405.3	1.8	Y	N	**2.0**
ECC405.4	1.8	Y	N	**2.0**
ECC405.5	1.8	Y	N	**2.0**
ECC405.6	1.8	Y	N	**2.0**

Qualifier level for CO (%)

External Assessment	University Exam	50
Internal Assessment	IA, Quizzes, Assignments etc.	60
	Course Exit Survey	60

Score for Target Attainment Levels

	1	2	3
Uni. Exam	< 50	>= 50 and < 60	>= 60
Oral/ Practical	< 55	>= 55 and < 65	>= 65
In Sem evaluation	< 60	>= 60 and < 70	>= 70
Course Exit	< 65	>= 65 and < 75	>= 75

The minimum Qualifier Level is for university exam is 50%

1. If <50% students get more than ----% marks, then score for the attainment will be 1.
2. if >=50% and <60% students get more than --- % marks, then score for the attainment will be 2.
3. if >=60% students get more than---% marks, then score for the attainment will be 3.

25

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

In semester Evaluation Marks:

1.Internal Assessment Marks

Roll no.	Name	IA1			IA2			Avg (20)
		CO1(5)	CO2(10)	CO3(5)	CO4(10)	CO5(5)	CO6(5)	
1	Shubham Dilip Baikar	2	5	4	7	4	4	13
2	Khushi Sanjay Benbanshi	4	5	3	9	3	1	13
3	P Bhaskaran Bavana	2	1	1	8	4	3	10
4	Soham Sanjay Birwadkar	3	3	2	6	2	0	8
5	Bhavesh B. Chaturvedi	4	6	3	10	5	5	17
6	Sachin Bachalal Choudhary	5	4	2	6	4	0	11
7	Nitish Lakshmisha Devadiga	4	4	1	7	3	3	11
8	Abhay Vinay Dubey	4	3	1	8	1	0	9
9	OM Rajesh Edwankar	4	1	1	9	4	2	11
10	Vaibhav Rajkumar Gaikwad	1	0	1	AB	AB	AB	1
11	Vinay Mahendra Gawai	2	1	1	9	2	1	8
12	Sahil Sudhir Gorivale	4	6	2	10	3	2	14
13	Mihir Mahesh Gosavi	2	2	0	10	1	0	8
14	Rahul Ramashray Gupta	3	0	2	9	0	4	9
15	Mitali Jain	3	3	3	9	4	3	13
16	Nidhi Gajendra Jain	2	4	3	9	5	4	14
17	Amarnath J.Jaiswar	2	1	1	9	3	4	10
18	Hemantkumar A Jena	2	3	1	10	6	2	12
19	Pranali Dadarao Kale	4	4	2	10	4	4	14
20	Rohit Anandrao Kale	4	3	2	10	4	0	12
21	Manohar Kaloni	3	4	5	9	4	3	14
22	Likhitkumar Khandelwal	5	4	3	10	1	4	14
23	Ayush Subhash Kilpady	3	6	0	10	4	3	13
24	Aryan Manoj Kore	2	4	0	9	4	4	12
25	Prasanna Jagdish Lahoti	3	1	2	8	0	2	8
26	Dhruv Arun Mishra	AB	AB	AB	AB	AB	AB	AB
27	Atharva Vilas More	4	7	0	9	4	4	14
28	Sakshi Anil More	3	5	4	10	4	4	15
29	Rashmi Prakash Mote	3	7	4	10	5	5	17
30	Omkar Ladu Naik	3	7	4	10	3	4	16
31	Navya R Nair	4	1	4	4	4	2	10
32	Varun Vishwas Parab	4	6	5	9	4	4	16
33	Ajay Patel	4	4	1	7	3	4	12
34	Richakumari Patel	3	4	1	7	4	4	12
35	Sneha Sandip Patil	2	3	4	0	0	0	5
36	Uday Satyawan Patil	1	2	1	8	3	4	10
37	Dipak M Pawar	2	3	3	10	4	0	11
38	Shreya Anant Phondke	5	6	1	9	3	4	14
39	Aarti Yogendra Prasad	3	6	3	10	5	4	16

40	Ayan Aq Qureshi	5	9	5	10	3	4	18
41	Pareek Piyush Ramawtar	3	4	1	4	2	3	8
42	Harsh Sanjay Raut	1	6	0	8	4	2	11
43	Aviraj Anil Rewale	2	0	0	6	3	4	8
44	Vishal Jitendra Sahani	3	3	0	10	0	2	9
45	Mahek Anis Shaikh	4	4	1	3	4	4	10
46	Dhruv S Sharma	2	2	0	9	4	4	11
47	Siddhi Anil Sharma	5	7	0	9	5	5	16
48	Omkar Dinesh Shelke	4	7	0	10	5	4	15
49	Devisha Jayraj Shetty	4	5	0	10	2	3	12
50	Harsh Solanki Shimpi	5	7	0	10	5	4	16
51	Singh Ashutosh	2	0	1	10	1	3	9
52	Mayur Surendra Tawde	1	4	3	7	0	1	8
53	Rhea Ramesh Titre	3	6	0	10	3	2	12
54	Vishal Ramesh Tiwari	2	7	1	8	3	4	13
55	Omkar Devanand Vaity	3	6	0	8	1	1	10
56	Aman Vishwakarma	1	5	0	9	3	2	10
57	Kaushal Wadekar	1	8	2	10	4	4	15
58	Nikunj Yogesh Wadke	3	7	4	9	3	4	15
59	Adarsh Sikandar Yadav	4	0	0	8	3	1	8
60	Rishi Omprakash Yadav	3	5	1	8	0	4	11
61	Palkade Tejas Prakash	3	5	1	7	3	0	10
62	Verma Baljeet Kuldeep	3	4	1	9	3	0	10
63	Gharat Ritik Rajendra	4	7	2	8	3	0	12
64	Gaikwad Mihir Rajendra	2	4	0	6	2	1	8
65	Ghag Jaydeep Dilip	3	3	1	6	4	3	10
66	Gharat Ritik Rajendra	4	6	0	5	3	2	10
67	Jobalia Udit Piyush	AB	AB	AB	AB	AB	AB	AB
68	Khedekar Prakash	2	8	1	4	3	0	9
69	Kiran Pravin Patil	3	2	1	8	3	2	10
70	Gaikwad Rajendra	4	3	1	5	3	0	8
71	Palkade Tejas Prakash	3	4	0	8	4	0	10
72	Parkhe Dileep Sarthak	2	8	1	6	3	2	11
73	Verma Baljeet Kuldeep	3	4	0	7	5	0	10
74	Mandar Sarwade	2	5	1	6	3	0	9
	Total No. of Students	74						
	Total Present	71	71	71	71	71	71	
	Qualifier Level (%)	60	60	60	60	60	60	
	Total Marks	5	10	5	10	5	5	
	Qualifier Level in terms of marks	3	6	3	6	3	3	
	No. of Students above Qualifier Level	46	23	17	64	55	38	
	% No. of Students above Qualifier Level	64.788	32.3944	23.943	90.1408	77.464	53.521	
	Attainment level	2	1	1	3	3	1	

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

2.Quiz and Assignment Marks

Roll no.	Name	Q1(CO1)	Q2(CO2)	Q3(CO3)	Q4(CO4)	Q5(CO5)	Q6(CO6)
1	Shubham Dilip Baikar	8 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
2	Khushi Sanjay Benbanshi	8 / 10	9 / 10	8 / 10	8 / 10	10 / 10	9 / 10
3	P Bhaskaran Bavana	7 / 10	9 / 10	9 / 10	8 / 10	10 / 10	9 / 10
4	Soham Sanjay Birwadkar	7 / 10	9 / 10	9 / 10	8 / 10	10 / 10	9 / 10
5	Bhavesh B. Chaturvedi	4 / 10	9 / 10	9 / 10	8 / 10	10 / 10	9 / 10
6	Sachin B. Choudhary	7 / 10	9 / 10	9 / 10	9 / 10	10 / 10	9 / 10
7	Nitish Devadiga	8 / 10	8 / 10	3 / 10	9 / 10	4 / 10	9 / 10
8	Abhay Vinay Dubey	8 / 10	9 / 10	9 / 10	8 / 10	10 / 10	9 / 10
9	OM Rajesh Edwankar	8 / 10	9 / 10	9 / 10	9 / 10	5 / 10	4 / 10
10	Vaibhav R. Gaikwad	ab	ab	ab	ab	ab	ab
11	Vinay Mahendra Gawai	8 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
12	Sahil Sudhir Gorivale	7 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
13	Mihir Mahesh Gosavi	7 / 10	9 / 10	1 / 10	9 / 10	10 / 10	9 / 10
14	Rahul Ramashray Gupta	8 / 10	8 / 10	9 / 10	8 / 10	10 / 10	9 / 10
15	Mitali Jain	6 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
16	Nidhi Gajendra Jain	6 / 10	2 / 10	9 / 10	7 / 10	10 / 10	9 / 10
17	Amarnath J.Jaiswar	8 / 10	9 / 10	9 / 10	9 / 10	3 / 10	9 / 10
18	Hemantkumar A Jena	8 / 10	9 / 10	9 / 10	8 / 10	10 / 10	9 / 10
19	Pranali Dadarao Kale	6 / 10	9 / 10	9 / 10	8 / 10	10 / 10	9 / 10
20	Rohit Anandrao Kale	7 / 10	8 / 10	9 / 10	9 / 10	10 / 10	9 / 10
21	Manohar G. Kaloni	8 / 10	9 / 10	8 / 10	9 / 10	10 / 10	9 / 10
22	Likhitkumar H.	8 / 10	9 / 10	7 / 10	5 / 10	6 / 10	4 / 10
23	Ayush Subhash Kilpady	9 / 10	6 / 10	9 / 10	7 / 10	10 / 10	9 / 10
24	Aryan Manoj Kore	6 / 10	9 / 10	9 / 10	9 / 10	10 / 10	9 / 10
25	Prasanna Jagdish Lahoti	8 / 10	9 / 10	9 / 10	9 / 10	10 / 10	9 / 10
26	Dhruv Arun Mishra	ab	ab	ab	ab	ab	ab
27	Atharva Vilas More	8 / 10	9 / 10	8 / 10	9 / 10	10 / 10	8 / 10
28	Sakshi Anil More	5 / 10	9 / 10	9 / 10	9 / 10	10 / 10	8 / 10
29	Rashmi Prakash Mote	8 / 10	9 / 10	8 / 10	6 / 10	10 / 10	9 / 10
30	Omkar Ladu Naik	8 / 10	9 / 10	7 / 10	6 / 10	10 / 10	9 / 10
31	Navya Ramakrishnan Nair	8 / 10	9 / 10	8 / 10	7 / 10	10 / 10	9 / 10
32	Varun Vishwas Parab	8 / 10	9 / 10	8 / 10	8 / 10	10 / 10	9 / 10
33	Ajay Patel	8 / 10	8 / 10	9 / 10	8 / 10	10 / 10	9 / 10
34	Richakumari Dinesh Patel	7 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
35	Sneha Sandip Patil	8 / 10	9 / 10	9 / 10	8 / 10	10 / 10	9 / 10
36	Uday Satyawan Patil	8 / 10	8 / 10	9 / 10	7 / 10	10 / 10	9 / 10
37	Dipak Machhindra Pawar	6 / 10	8 / 10	9 / 10	9 / 10	9 / 10	8 / 10
38	Shreya Anant Phondke	4 / 10	9 / 10	9 / 10	6 / 10	10 / 10	9 / 10
39	Aarti Yogendra Prasad	8 / 10	9 / 10	8 / 10	9 / 10	10 / 10	9 / 10
40	Ayan Abdulkhaliq Qureshi	7 / 10	9 / 10	9 / 10	7 / 10	4 / 10	5 / 10

41	Pareek Piyush Ramawtar	3 / 10	9 / 10	9 / 10	7 / 10	9 / 10	9 / 10
42	Harsh Sanjay Raut	8 / 10	9 / 10	9 / 10	8 / 10	10 / 10	9 / 10
43	Aviraj Anil Rewale	3 / 10	5 / 10	3 / 10	2 / 10	2 / 10	2 / 10
44	Vishal Jitendra Sahani	8 / 10	9 / 10	9 / 10	7 / 10	9 / 10	9 / 10
45	Mahek Anis Shaikh	8 / 10	9 / 10	9 / 10	9 / 10	10 / 10	9 / 10
46	Dhruv S. Sharma	7 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
47	Siddhi Anil Sharma	8 / 10	8 / 10	9 / 10	9 / 10	4 / 10	9 / 10
48	Omkar Dinesh Shelke	8 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
49	Devisha Jayraj Shetty	5 / 10	9 / 10	9 / 10	9 / 10	10 / 10	9 / 10
50	Harsh Solanki Shimpi	8 / 10	9 / 10	9 / 10	6 / 10	10 / 10	9 / 10
51	Singh Ashutosh	6 / 10	9 / 10	9 / 10	9 / 10	10 / 10	9 / 10
52	Mayur Surendra Tawde	5 / 10	9 / 10	Ab	ab	2 / 10	9 / 10
53	Rhea Ramesh Titre	7 / 10	9 / 10	9 / 10	9 / 10	9 / 10	9 / 10
54	Vishal Ramesh Tiwari	Ab	9 / 10	9 / 10	3 / 10	9 / 10	9 / 10
55	Omkar Devanand Vaity	6 / 10	9 / 10	9 / 10	4 / 10	10 / 10	9 / 10
56	Aman Vishwakarma	6 / 10	8 / 10	9 / 10	8 / 10	10 / 10	9 / 10
57	Kaushal Prakash Wadekar	9 / 10	9 / 10	8 / 10	8 / 10	10 / 10	9 / 10
58	Nikunj Yogesh Wadke	7 / 10	9 / 10	9 / 10	3 / 10	2 / 10	9 / 10
59	Adarsh Sikandar Yadav	7 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
60	Rishi Omprakash Yadav	4 / 10	5 / 10	1 / 10	9 / 10	10 / 10	9 / 10
61	Hemant Suryakant Bhor	4 / 10	8 / 10	9 / 10	7 / 10	9 / 10	9 / 10
62	Riddhesh Chaudhari	3 / 10	9 / 10	9 / 10	9 / 10	10 / 10	9 / 10
63	Sankalp Dilip Chaudhari	7 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
64	Gaikwad Mihir Rajendra	ab	ab	ab	ab	ab	ab
65	JAYDEEP DILIP GHAG	ab	9 / 10	9 / 10	9 / 10	10 / 10	9 / 10
66	Ritik Rajendra Gharat	7 / 10	3 / 10	9 / 10	6 / 10	9 / 10	ab
67	Tejas Prakash Palkade	ab	9 / 10	ab	9 / 10	9 / 10	9 / 10
68	Rajdip prakash khedekar	7 / 10	9 / 10	9 / 10	9 / 10	10 / 10	8 / 10
69	Jobalia Udit Piyush	ab	ab	ab	7 / 10	ab	ab
70	Devanshu Manchekar	3 / 10	9 / 10	8 / 10	7 / 10	10 / 10	9 / 10
71	Sarthak Parkhe	6 / 10	9 / 10	9 / 10	7 / 10	10 / 10	9 / 10
72	Kiran patil	ab	9 / 10	9 / 10	8 / 10	ab	9 / 10
73	Baljeet verma	ab	ab	9 / 10	ab	10 / 10	9 / 10
74	Mandar Ramrao Sarwade	ab	9 / 10	ab	4 / 10	ab	9 / 10
	Total No. of Students	74					
	Total Present	64	69	67	69	68	69
	Qualifier Level (%)	60	60	60	60	60	60
	Total Marks	10	10	10	10	10	10
	Qualifier Level in terms of marks	6	6	6	6	6	6
	No. of Students above Qualifier Level	53	65	63	63	60	65

% No. of Students above Qualifier Level	82.8125	94.2029	94.0299	91.3043	88.2353	94.2029
Attainment level	3	3	3	3	3	3

3. Assignment Marks

Roll no.	Name	Ass - 1 CO1	Ass - 3 CO4	Ass - 2 CO2
1	Shubham Dilip Baikar	9	7	9
2	Khushi Sanjay Benbanshi	5	7	9
3	P Bhaskaran Bavana	5	6	8
4	Soham Sanjay Birwadkar	6	6	5
5	Bhavesh Brijendra C.	8	7	9
6	Sachin Bachalal Choudhary	7	7	5
7	Nitish Lakshmisha Devadiga	9	7	8
8	Abhay Vinay Dubey	7	7	8
9	OM Rajesh Edwankar	7	7	5
10	Vaibhav Rajkumar Gaikwad	Ab	Ab	Ab
11	Vinay Mahendra Gawai	8	7	6
12	Sahil Sudhir Gorivale	7	5	8
13	Mihir Mahesh Gosavi	10	5	5
14	Rahul Ramashray Gupta	8	7	8
15	Mitali Jain	6	5	8
16	Nidhi Gajendra Jain	7	5	9
17	Amarnath Jamunaprasad J.	7	5	5
18	Hemantkumar Amarendra J.	10	7	8
19	Pranali Dadarao Kale	10	8	10
20	Rohit Anandrao Kale	9	7	9
21	Manohar Gangadutta Kaloni	9	8	6
22	Likhitkumar Hastimal K.	9	7	8
23	Ayush Subhash Kilpady	10	7	6
24	Aryan Manoj Kore	7	7	5
25	Prasanna Jagdish Lahoti	8	7	6
26	Dhruv Arun Mishra	AB	AB	AB
27	Atharva Vilas More	10	8	8
28	Sakshi Anil More	10	7	10
29	Rashmi Prakash Mote	10	8	8
30	Omkar Ladu Naik	9	7	8
31	Navya Ramakrishnan Nair	10	7	6
32	Varun Vishwas Parab	7	7	7
33	Ajay Patel	9	7	7
34	Richakumari Dinesh Patel	10	7	6

35	Sneha Sandip Patil	8	8	8
36	Uday Satyawan Patil	10	5	8
37	Dipak Machhindra Pawar	8	7	6
38	Shreya Anant Phondke	10	8	10
39	Aarti Yogendra Prasad	10	8	6
40	Ayan Abdulkhaliq Qureshi	10	7	5
41	Pareek Piyush Ramawtar	5	5	5
42	Harsh Sanjay Raut	8	5	6
43	Aviraj Anil Rewale	5	5	5
44	Vishal Jitendra Sahani	5	6	6
45	Mahek Anis Shaikh	7	5	6
46	Dhruv Suneelkumar Sharma	10	9	7
47	Siddhi Anil Sharma	10	6	7
48	Omkar Dinesh Shelke	10	7	10
49	Devisha Jayraj Shetty	10	7	7
50	Harsh Solanki Shimpi	10	7	10
51	Singh Ashutosh	8	7	9
52	Mayur Surendra Tawde	5	6	7
53	Rhea Ramesh Titre	5	5	7
54	Vishal Ramesh Tiwari	8	7	5
55	Omkar Devanand Vaity	8	7	5
56	Aman Sanjay Vishwakarma	5	7	6
57	Kaushal Prakash Wadekar	8	7	9
58	Nikunj Yogesh Wadke	8	8	7
59	Adarsh Sikandar Yadav	5	5	5
60	Rishi Omprakash Yadav	10	7	8
61	Hemant Suryakant Bhor	6	5	5
62	Riddhesh Sandip Chaudhari	6	7	5
63	Sankalp Dilip Chaudhari	6	6	5
64	Gaikwad Mihir Rajendra	7	5	7
65	JAYDEEP DILIP GHAG	6	6	5
66	Ritik Rajendra Gharat	7	7	7
67	Tejas Prakash Palkade	6	5	7
68	Rajdip prakash khedekar	6	5	5
69	Jobalia Udit Piyush	ab	ab	ab
70	Devanshu Manchekar	7	5	5
71	Sarthak Parkhe	6	6	5
72	Kiran patil	6	5	5
73	Baljeet verma	6	6	5
74	Mandar Ramrao Sarwade	6	5	5
	Total No. of Students	74		
	Total Present	70	70	68
	Qualifier Level (%)	60	60	60

Total Marks	10	10	10
Qualifier Level in terms of marks	6	6	6
No. of Students above Qualifier Level	62	52	48
% No. of Students above Qualifier Level	**88.57**	**74.29**	**70.59**
Attainment level	**3**	**3**	**3**

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

End semester Evaluation Marks

Roll No.	Name of Student	University Exam
1	Shubham Dilip Baikar	35
2	Khushi Sanjay Benbanshi	32
3	P Bhaskaran Bavana	37
4	Soham Sanjay Birwadkar	8
5	Bhavesh B. Chaturvedi	53
6	Sachin Bachalal Choudhary	34
7	Nitish Lakshmisha Devadiga	32
8	Abhay Vinay Dubey	18
9	OM Rajesh Edwankar	42
10	Vaibhav Rajkumar Gaikwad	3
11	Vinay Mahendra Gawai	38
12	Sahil Sudhir Gorivale	13
13	Mihir Mahesh Gosavi	32
14	Rahul Ramashray Gupta	39
15	Mitali Jain	32
16	Nidhi Gajendra Jain	39
17	Amarnath J.Jaiswar	32
18	Hemantkumar A Jena	40
19	Pranali Dadarao Kale	36
20	Rohit Anandrao Kale	38
21	Manohar Gangadutta Kaloni	51
22	Likhitkumar H. Khandelwal	32
23	Ayush Subhash Kilpady	32
24	Aryan Manoj Kore	32
25	Prasanna Jagdish Lahoti	49
26	Dhruv Arun Mishra	43
27	Atharva Vilas More	55
28	Sakshi Anil More	35
29	Rashmi Prakash Mote	21
30	Omkar Ladu Naik	53
31	Navya Ramakrishnan Nair	33
32	Varun Vishwas Parab	51
33	Ajay Patel	37
34	Richakumari Dinesh Patel	13
35	Sneha Sandip Patil	13
36	Uday Satyawan Patil	49
37	Dipak Machhindra Pawar	49
38	Shreya Anant Phondke	42
39	Aarti Yogendra Prasad	45
40	Ayan Abdulkhaliq Qureshi	32
41	Pareek Piyush Ramawtar	32

42	Harsh Sanjay Raut	47
43	Aviraj Anil Rewale	42
44	Vishal Jitendra Sahani	32
45	Mahek Anis Shaikh	57
46	Dhruv Suneelkumar Sharma	52
47	Siddhi Anil Sharma	48
48	Omkar Dinesh Shelke	64
49	Devisha Jayraj Shetty	32
50	Harsh Solanki Shimpi	19
51	Singh Ashutosh	32
52	Mayur Surendra Tawde	39
53	Rhea Ramesh Titre	38
54	Vishal Ramesh Tiwari	46
55	Omkar Devanand Vaity	49
56	Aman Sanjay Vishwakarma	49
57	Kaushal Prakash Wadekar	32
58	Nikunj Yogesh Wadke	65
59	Adarsh Sikandar Yadav	34
60	Rishi Omprakash Yadav	20
61	Palkade Tejas Prakash	37
62	Verma Baljeet Kuldeep	16
63	Gharat Ritik Rajendra	13
64	Gaikwad Mihir Rajendra	32
65	Chaudhari Riddhesh Sandip	35
66	Ghag Jaydeep Dilip	6
67	Khedekar Rajdip Prakash	35
68	Bhor Hemant Suryakant	32
69	Chaudhari Sankalp Dilip	3
70	Kiran Pravin Patil	37
71	Jobalia Udit Piyush	ab
	Total No. of Students	74
	Total Present	70
	Qualifier Level (%)	50
	Total Marks	80
	Qualifier Level in terms of marks	40
	No. of Students above Qualifier Level	23
	% No. of Students above Qualifier Level	32.86
	Attainment level	1

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Course Exit Survey

S. No	CO1	CO2	CO3	CO4	CO5	CO6
1	3	3	3	3	3	3
2	3	3	3	3	3	3
3	3	3	3	3	3	3
4	3	3	3	3	3	3
5	3	3	3	3	3	3
6	3	3	3	3	3	3
7	3	3	3	3	3	3
8	2	2	2	2	1	3
9	3	3	2	3	3	3
10	3	3	3	3	3	3
11	3	3	3	3	3	3
12	3	3	2	2	3	2
13	2	2	2	2	2	2
14	2	2	2	2	2	2
15	3	3	3	3	3	3
16	2	2	2	2	2	2
17	3	3	3	3	3	3
18	2	2	2	2	2	2
19	2	3	3	2	3	2
20	3	3	3	3	3	3
21	3	3	3	2	3	3
22	2	1	1	1	2	1
23	3	3	3	3	3	3
24	3	3	3	3	3	3
25	3	3	3	3	3	3
26	3	3	3	3	3	2
27	2	3	3	3	3	2
28	3	3	3	3	3	3
29	3	3	3	3	3	3
30	3	2	3	3	3	3
31	2	2	2	2	2	2
32	3	3	3	3	3	3
33	2	2	2	2	2	2
34	1	3	2	3	2	3
35	3	3	3	3	3	3
36	3	3	3	3	3	3
37	3	3	3	3	3	3
38	2	3	3	3	3	2
39	3	2	3	3	3	3
40	3	3	3	3	3	3
41	2	2	2	2	2	2
42	3	3	3	3	3	3
43	3	3	3	3	3	3

44	2	3	2	2	1	2
45	2	2	2	2	2	2
46	3	3	2	2	3	2
47	3	3	3	3	3	3
48	3	3	3	3	3	3
49	2	2	2	2	2	2
50	3	2	3	2	3	3
51	1	2	2	3	2	2
52	2	2	2	2	2	2
53	3	3	3	3	3	3
54	2	2	2	2	2	2
55	3	3	3	3	3	3
56	3	3	3	3	3	3
57	2	2	2	2	2	2
58	2	2	3	3	2	2
59	3	3	3	3	3	3
60	3	3	2	3	3	3
61	2	3	3	3	3	3
62	3	3	3	2	3	3
63	3	3	3	3	3	3
64	3	3	3	3	3	3
Total No. of Students	74					
Total Present	64	64	64	64	64	64
Qualifier Level (%)	65	65	65	65	65	65
Maximum Level	3	3	3	3	3	3
Qualifier Level in terms of marks	1.95	1.95	1.95	1.95	1.95	1.95
No. of Students above Qualifier Level	62	63	63	63	62	63
% No. of Students above Qualifier Level	96.875	98.4375	98.4375	98.4375	96.875	98.4375
Attainment level	3	3	3	3	3	3

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Result Analysis

Number of Students Appeared	70
Number of Students Passed	57
Number of Students Failed	13
Percentage of Result	81.4%
Number of Students with marks $\geq 80\%$	02
Number of Students with marks $60 \leq \% < 80$	13
Number of Students with marks $40 \leq \% < 60$	42

Attainment through Internal Assessment (X1)

	ECC405.1	ECC405.2	ECC405.3	ECC405.4	ECC405.5	ECC405.6
IA1	2	1	1			
IA2				3	3	1
Q1	3					
Q2		3				
Q3			3			
Q4				3		
Q5					3	
Q6						3
A1	3					
A2		3				
A3				3		
CE	3	3	3	3	3	3
Avg. (X1)	2.75	2.5	2.33	3.00	3.00	2.33

Attainment through External assessment (X2)

University Exam (Theory) (80 marks)				
Qualifier Level (%)	**Qualifier Level in terms of marks**	**No. of Students above Qualifier Level**	**% No. of Students above Qualifier Level**	**Attainment level**
50	40	23	32.86	1

CO Attainment:

CO	Average of Internal Attainment (X1)	Weighted average of External Attainment (X2)	Y = 0.2 X1 + 0.8 X2
Weightage for End-semester Attainment (W2) = 80% **Weightage for In-semester Attainment (W1) = 20%**			
ECC405.1	2.75	1.00	1.70
ECC405.2	2.5	1.00	1.60
ECC405.3	2.33	1.00	1.53
ECC405.4	3.00	1.00	1.80
ECC405.5	3.00	1.00	1.80
ECC405.6	2.33	1.00	1.53
Overall CO attainment of Course			**1.66**

	Additional Activity
Event	Industry Visit
Venue	Akashwani (AIR), Churchgate, Mumbai
Date & Time	10th March, 2023 From 9 am to 4 pm
Objectives	1. To understand working of Akashwani station and transmission systems. 2. To understand application of Amplitude Modulation and Frequency Modulation in Radio system.
Speakers	Mr. Solanki Mr. P.D. Gogate Mr. Rajendra Bagul
Faculties	Dr. Amrita Ruperee, HOD-EXTC, Ms. Trupti Shah, Assistant Professor
Student Co-ordinator	Harsh Shimpi
No. of Students	30
Brief Report	Akashwani Churchgate, also known as All India Radio Churchgate, is a prominent radio station operated by Prasar Bharati, India's public broadcasting agency. It serves as a vital medium for disseminating news, entertainment, educational content, and cultural programs to millions of listeners across the country. Prior to the visit, our group was briefed about the history and significance of Akashwani Churchgate. We were instructed to research the radio broadcasting industry, its evolution, and the role of radio in the contemporary media landscape. This preparatory phase helped us better understand the context of our visit and allowed us to ask relevant questions during the tour. We were given an introductory overview of the studio by Mr. Solanki. There were around 32 different studios in the building having different shapes and sizes with different facilities. There were 3 sections namely Engineering section, Program Section & Administration section. In the engineering section tasks such as maintaining the recordings of the audio signals, equipment maintenance, noise cancellation and amplification, etc. were done. The administration section supervises the broadcasting of the channels. Later the staff gave us an overview of Vacuum tube transmitter and its functionalities. Mr. Solanki explained well what are the various channels and their frequencies, what are the carrier signals and its optimization and how the modulation & demodulation of the signals are done. Every studio generates different frequency signals, hence no mixing of frequencies takes place. Also we were explained about various techniques of modulations the studio utilizes such as AM

(Amplitude modulation) & FM (Frequency Modulation) transmission and their differences. Depending on the transmission region lies near or far, low and high level of modulation of signals were used which were described properly to us. Later we were explained about various amplifiers being used such as for an audio signal Class B amplifier is utilized.

The functioning of recording was demonstrated by recording his voice, it was being edited and noise cancellation was applied with the help of filters and that particular program was ready to broadcast. Mr. Gogate gave a brief of the giant antenna dish placed on the terrace and the transmission room from where the high frequency signals are being transmitted in the region. The uplink and downlink processes were explained in depth at a cabin on terrace. A monitoring rack is a receiver used for uplink. Later he proceeded to explain about Waveguide having a frequency range of 3-6 GHz. He also explained about how the dishes changes their position in order to direct or receive waves in/from a particular direction. After the visit from the terrace area students were guided to the Stand-by Studio.

After our visit from the recording room, we were guided to the hall where QnA session was conducted. Students asked questions related to uplink/downlink streams and various applications which were beautifully explained by the staff.

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Attainment of Course Outcomes:

CO	Target Set	Actual Attainment	CO Attainment Achieved (Y or N)
ECC405.1	2.0	1.70	N
ECC405.2	2.0	1.60	N
ECC405.3	2.0	1.53	N
ECC405.4	2.0	1.80	N
ECC405.5	2.0	1.80	N
ECC405.6	2.0	1.53	N
Overall CO Attainment of the Course			**1.66**

Attainment of POs and PSOs:

	Program Outcome														
	PO 1	PO 2	PO 3	PO 4	P0 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
PO/PSO Attainment	2.5	1.66	-	-	-	-	-	1.67	1.67	1.67	-	-	2	2	-
Rounded PO/PSO Attainment	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**	**-**	**-**	**2**	**2**	**-**
Actual PO/PSO Attainment	1.43	0.96	-	-	-	-	-	1.00	1.00	1.00	-	-	1.2	1.11	1.11

_____

Sign. of Faculty

42

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

Observations and Action Taken

ECC405.1	Target Level	2.00
	Attainment Level	1.7
	Observations	Able to explain the fundamentals of communication systems and types of noises. Students are facing difficulty in solving numerical problem.
	Action	Unique assignments will be prepared for each student to ensure that all students should solve the assignment at their own.
ECC405.2	Target Level	2.00
	Attainment Level	1.6
	Observations	Facing difficulty in understanding and remembering the various AM modulation techniques and solving the numerical problem.
	Action	Repetitive discussion session will be planned. Unique assignment will be prepared for each student to ensure that all students should solve the assignment at their own.
ECC405.3	Target Level	2.00
	Attainment Level	1.53
	Observations	Facing difficulty in understanding and remembering the FM modulation and Demodulation techniques.
	Action	Repetitive discussion session will be planned to clear the doubts of students.
ECC405.4	Target Level	2.00
	Attainment Level	1.8
	Observations	For some students there was a difficulty in understanding and remembering the concept of Radio receiver and solving the quiz.
	Action	Repetitive discussion session will be planned to clear the doubts of students and Extra time will be allocated to clear the concept.
ECC405.5	Target Level	2.00
	Attainment Level	1.8
	Observations	For some students there was a difficulty in understanding the concept of sampling and PCM.
	Action	Extra time will be allocated to clear the concept.

43

Vidyavardhini's College of Engineering & Technology

Department of Electronics and Telecommunication Engineering

ECC405.6	Target Level	2.00
	Attainment Level	1.53
	Observations	Able to explain FDM and TDM techniques, facing difficulty in explaining FDM and TDM application
	Action	Applications of FDM and TDM will be explained with more examples.

Signature of Faculty

Signature of HOD

Dr. Amtria Ruperee
(HoD, EXTC)
HEAD
Dept. of Electronics and
Telecommunication Engg.
Vidyavardhini's College of
Engineering & Technology
Vasai Road