SINHGAD TECHNICAL EDUCATION SOCIETY'S®

SMT. KASHIBAI NAVALE COLLEGE OF ENGINEERING®

Approved by AICTE Vide F. No. 740-89-004 (NDEGAPR/ET/2000) &
Affiliated to Savitribai Phule Pune University ID. No. PU/PN/ENGG/155/2001
Accrediated by NBA & NACC
Recognized by UGC under Section 2 (f) & 12 (B) of UGC Act 1956

Sinhgad Institutes

S. No. 44/1, Vadgaon (Budruk), Off Sinhgad Road, Pune - 411041.
• Tel : +9120-24354938, 24100295/293 • Tele Fax : 020-24354938 • Email : principal.skncoe@sinhgad.edu • Website : www.sinhgad.edu

PROF. M. N. NAVALE	DR. (MRS.) SUNANDA M. NAVALE	DR. A. V. DESHPANDE
M.E. (Elect.), MIE, MBA.	B. A., M. P. M., Ph.D.	B. E., M. E. (Computer Engg.), Ph. D.
FOUNDER - PRESIDENT	FOUNDER - SECRETARY	PRINCIPAL

Date: 10/05/2022

To,
The Director
National Assessment and Accreditation Council (NAAC)
P.O. Box No. 1075, Nagarbhavi,
Bengaluru- 560 072

Subject: Proofs of Metric No. 1.4.2

Reference: Metric No. 1.4.2: Feedback process of the Institution may be classified as follows:
Options: A. Feedback collected, analysed and action taken and feedback available on website

Dear sir/Madam,

Please find below feedback process of the Institution (Feedback collected, analysed and action taken and feedback available on website)

Details of supporting documents are as follows:

Sr. No.	Details of document available	Page No.
	Document related to Feedback process of the Institution	
1	1. Feedback collected	Please Refer 1.4.1 available on website
	2. Department wise Action taken Report on feedback signed by the Head of the Department	3-4
	3. Document showing the communication with the affiliating University for the Feedback provided.	5-6
	4. Action taken by the affiliating university on the feedback	7-26

Thanking you,

Principal
(Dr. A. V. Deshpande)
Principal
Smt. Kashibai Navale
College of Engineering
Vadgoan(Bk.), Pune - 41.

1.4.2: Feedback process of the Institution may be classified as follows:

Options:

A. Feedback collected, analysed and action taken and feedback available on website

B. Feedback collected, analysed and action has been taken

C. Feedback collected and analysed

D. Feedback collected

E. Feedback not collected

Feedback process of the Institution

Feedbacks were collected from the stakeholder related to curriculum design and development. Feedbacks were analyzed to prepare a consolidated report signed by head of the department (HOD) on up-gradation of syllabus. This report was communicated to university through the Principal to the affiliated university/BoS to be considered for up-gradation/revision of syllabus. Index below shows the feedback process of the Institution

Index

Sr. No.	Description
1.	Feedback taken
2.	Department wise Action taken Report on feedback signed by the Head of the Department
3.	Document showing the communication with the affiliating University for the Feedback provided.
4.	Action taken by the affiliating university on the feedback

Head
Dept. of Electronics &
Telecommunication Engineering
Smt. Kashibai Navale Coll.
of Engineering, Pune - 411

2. Department wise Action taken Report on feedback signed by the Head of the Department

Feedbacks on curriculum had been taken from stakeholder. These feedbacks are analyzed and consolidated report is prepared by head of the department to be submitting it to BoS of affiliated university for up-gradation of curriculum.

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FOUNDER - SECRETARY

DR. A. V. DESHPANDE
B. E., M. E. (Computer Engg.), Ph. D.
PRINCIPAL

Consolidation Report on Syllabus Upgradation

Feedback was collected from the stakeholder such as students, teacher, alumini, employer and suggestions on updating og curriculum of SE/TE/BE Inofrmation Technology 2015 Pattern w.e.f from 2016 is mentioned below for conveing it to SPPU an affiliated university

Sr. No.	Course Name	Topic to be added with reason	Topic to be omitted with reason
1	314445 Human-Computer Interaction	Include Usability techniques and some design thinking model	
2	414453 Information and Cyber Security	Add some current security tools. Give some focus on latest cyber attack and cyber crime	
3	414462 Distributed Computing System	Give more focus on security and privacy issues of distributed file systems.	
4	314443 Software Engineering &Project Management	Need practicals for project management tools	
5	414455 Software Design and Modeling	This subject should be for either SE or TE students	
6	314450 Computer Network Technology	Add topics related to advancements in wireless network . Allign syllabus of FCCN, CNT, IoT as iot of contents are duplicated.	Syllabus contents are very vast can't complete intime provided by university. Divide Network Layer in two parts as it is too vast.
7	414454 Machine Learning and Applications	Need to include this subject for TE Students	
8	314444 Operating System	Shell scripting Language should be included.	
9	214443 Digital Electronics and Logic Design	Processors and Controllers should be introduced	

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Stakeholders Feedback analysis report:

Consolidated report on syllabus up Gradation:

Feedback was taken from stakeholders suggestions on updating of curriculum of SE 2015 course in SE 2019 course from June 2019 is mentioned below for convening it to SPPU an affiliated university.

Sr. No.	Course Name	Topic to be added	Topic to be omitted
1	Signals & Systems	No addition required	Nil
2	Electronic Devices & Circuits	No addition required	Nil
3	Electrical Circuits and Machines	For other universities Network Theory and Electrical machines are separate subject which satisfy requirements of Network fundamentals.	Transformer, Reluctance motors, Universal motors.
4	Data Structures and Algorithms	No addition required	Nil
5	Digital Electronics	No addition required	Nil
6	Engineering Mathematics III	No addition required	Nil
7	Integrated Circuits	No addition required	Nil
8	Control Systems	Matlab programming and simulation for determination of stability need to be added	Nil
9	Analog Communication	Frequency domain analysis topic should be included.	Noise
10	Object Oriented Programming	No addition required	Nil

Dr. S.K.Jagtap
Head of Department
Dept. of Electronics &
Telecommunication Engineering
Smt. Kashibai Navale College
of Engineering, Pune - 411 041

Dr. A.V.Deshpande
Principal

Principal
Smt. Kashibai Navale
College of Engineering
Vadgoan(Bk.), Pune - 41.

3. Document showing the communication with the affiliating University for the Feedback provided.

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To

Dr. Surendra Mahajan,
Member Board of Studies,
Information Technology,
SPPU, Pune-43

Subject – Regarding Curriculum gaps identified in SPPU Curriculum (2015 Course)

Respected Sir,

This is in relation to the above-mentioned topic. Currently, we are referring to the SPPU prescribed syllabus for SE/TE/BE (2015 Course). We've gotten feedback from our students, teachers, and alumni. In addition to, we analysed all of the feedback and discovered that the students need more exposure in cross cutting issues like "Ethics and Social Science", "Environment and Sustainability" etc. Elective subjects / Open Electives should be prioritised in order to acquire interdisciplinary abilities. Exposure should be provided to students through internships/industrial visits to encourage them to become entrepreneurs. This is a kind request include new subjects, laboratories , related to the above categories in the next revision of the syllabus for SE/TE/BE.

Thanking You,

Yours Truly,

HOD
Department of Information Technology
Smt Kashibai Navale College of Engineering

Copy To :

1. Dr. Lalit Patil – BoS Member,

Dear Sir, The suggestions are noted and shall be incorporated in subsequent revisions. , BoS member Dr. S.A. Mahajan

SINHGAD TECHNICAL EDUCATION SOCIETY'S

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FOUNDER - PRESIDENT	FOUNDER - SECRETARY	PRINCIPAL

To,

Member Board of Studies,

Electronics & Telecommunication,

SPPU, Pune-43.

Subject: Regarding Curriculum gaps identified in SPPU Curriculum SE(2015 Course).

Respected Sir,

This is in relation to the above-mentioned topic. Currently, we are referring to the SPPU prescribed syllabus for SE (2015 course). We have gotten feedback from our students, teachers and alumina. In addition to we analyzed all of the feedback for up gradation of SPPU syllabus SE (2019 course).

The detail report is attached herewith for your information and necessary action. This is a kind request to include new topics, laboratories which are mentioned in attachment for the next revision of the syllabus for SE.

Thanking you,

Yours Truly,

Dr.S.K.Jagtap

HOD E&TC

Head
Dept. of Electronics &
Telecommunication Engineering
Smt. Kashibai Navale College
of Engineering, Pune - 411 041

4. Action taken by the affiliating university on the feedback

Curriculum for Second Year of Information Technology (2019 Course), Savitribai Phule Pune University

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Savitribai Phule Pune University, Pune
Second Year Information Technology (2019 Course)

214450 (A): Mandatory Audit Course 3:
Ethics and Values in Information Technology

Teaching Scheme:	Credit Scheme:	Examination Scheme:
01hrs/week	Non Credit	Audit Course

Prerequisite Courses, if any:—

Course Objectives:
1. To understand and implement the values and principles in the field of Information Technology.
2. To nurture honest and responsible professionals in Information Technology.
3. To develop student's understanding about social/ professional ethical issues related to Information Technology.
4. To inculcate professional ethics in the field of IT.

Course Outcomes:

On completion of this course students will be able to-

CO1: Adapt the global ethical principles and modern ethical issues.
CO2: Apprehend ethics in the business relationships and practices of IT.
CO3: Implement trustworthy computing to manage risk and security vulnerabilities.
CO4: Analyse concerns of privacy, privacy rights in information-gathering practices in IT.

COURSE CONTENTS

Unit -I	An Overview of Ethics	03hrs

An overview of Ethics: Brief about ethics, Ethics in the Business World, Ethics in IT.

Ethics for IT professionals and IT users: IT professionals: Changing Professional Services, Professional Relationships, Codes of Ethics, awareness of IT malpractices, IT Users: Common Ethical Issues for IT Users, Supporting the Ethical Practices of IT Users.

Mapping of Course Outcomes for Unit I	CO1 , CO2

Unit- II	Computer And Internet Crime	03hrs

Introduction: IT security incidents, Types of Exploits, Types of Perpetrators, Laws for Prosecuting Computer Attacks, Implementing Trustworthy Computing, Risk and Vulnerability Assessment, Educating Employees, Contractors, and Part-Time Workers, Establishing a Security Policy

Privacy: The right of Privacy, Privacy Protection and the Law, Key Privacy and Anonymity Issues Identity Theft, Consumer Profiling, Treating Consumer Data Responsibility, Workplace Monitoring

Freedom of Expression: Defamation and Hate Speech, Key Issues, Controlling Access to Information on the Internet, Anonymity on the Internet, Corporate Blogging, Pornography

Mapping of Course Outcomes for Unit II	CO3, CO4

SE (Information Technology) Syllabus (2019 Course)   45

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Curriculum for Second Year of Information Technology (2019 Course), Savitribai Phule Pune University

Unit- III	Social Networking &Ethics of IT Organization	03 hrs

Social Networking: Brief about Social Networking, **Social Networking Ethical Issues:** Cyber bullying, Cyber stalking, Encounters with Sexual Predators, Uploading of Inappropriate Material,

Online Virtual Worlds: Crime in Virtual Worlds, Educational and Business Uses of Virtual Worlds.

Ethics of IT Organization: Key Ethical Issues for Organizations, of Workers, Outsourcing, Whistle-blowing, Code of Ethics and Professional Conduct.

Mapping of Course Outcomes for Unit III	CO2, CO3, CO4

Unit - IV	Case Study	03hrs

Malware, Medical Implants, Abusive Workplace Behaviour, Automated Active Response Weaponry, Malicious Inputs to Content Filters.

Mapping of Course Outcomes for Unit IV	CO1, CO2, CO3, CO4

Text Books:

1. George Reynolds,"Ethics in Information Technology", Cengage learning, 5th Edition
2. R. Subramanian, "Professional Ethics", OXFORD University Press, Second Edition

Reference Books:

1. William Lillie,"An Introduction to Ethics", Allied Publishers
2. Charles b. Fleddermann, "Engineering Ethics", Prentice Hall
3. M.Govindarajan,S.Natarajan&V.S.Senthilkumar, "Engineering Ethics &Human Values", PHI Learning
4. "ACM Code of Ethics and Professional Conduct Case Studies" https://www.acm.org/code-of-ethics/case-studies
5. "Case Studies of Ethics", https://flylib.com/books/en/4.269.1.115/1/
6. "UNODC Case Studies" https://www.unodc.org/e4j/en/integrity-ethics/module-12/exercises/case-studies.html

Evaluation :

Students should select any one of the topic in a group of 3 to 5. Students should submit a written report and make a presentation on the topic. The task should not be repeated among students. Report will be evaluated by the faculty as per rubrics defined by him/her/them at start of course.

SE (Information Technology) Syllabus (2019 Course)

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Curriculum for Second Year of Information Technology (2019 Course), Savitribai Phule Pune University

Savitribai Phule Pune University, Pune Second Year Information Technology (2019 Course) 214445: Basics of Computer Network		
Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory(TH):03hrs/week	03	Mid_Semester: 30 Marks End_Semester: 70 Marks

Prerequisite Courses, if any: Basics of communication

Course Objectives:

1. To understand the fundamentals of communication system.
2. To understand the basics of internetworking.
3. To understand services and protocols used at Physical, Data Link, Network, Transport Layer.

Course Outcomes:

On completion of the course, students will be able to–

CO1: Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.

CO2: Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.

CO3: Compare different access techniques, channelization and IEEE standards.

CO4: Apply the skills of subnetting, supernetting and routing mechanisms.

CO5: Differentiate IPv4 and IPv6.

CO6: Illustrate services and protocols used at transport layer.

COURSE CONTENTS		
Unit I	Data Communication and Network Models	06 hrs

Introduction to communication Theory - Basics of data communication, Types of Signals, A/D, D/A, A/A, D/D Signal Conversion Methods, Bandwidth Utilization and Data Rate Limits, Multiplexing Techniques, Data rate limits, Topologies, Noise, types of noise, Shannon Hartley Theorem, Channel capacity, Nyquist and Shannon Theorem, Bandwidth S/N trade off.

Network Models And addressing - OSI Model TCP/IP Model (Data Format, Addressing Mechanisms, Devices)

Case Study	Study of Physical layer components such as Cable, NIC, hub, etc. available in the computers /laboratories of your department
Mapping of Course Outcomes for Unit I	CO1

Unit II	Error Detection, Correction and Data Link Control	06 hrs

Data Link Layer: Data Link Layer Services, Error Detection and Correction: Introduction, Error Detection and Error Correction. Linear Block Codes: hamming code, Hamming Distance, parity check code. Cyclic Codes: CRC (Polynomials), Advantages of Cyclic Codes, Other Cyclic Codes (Examples: CHECKSUM: One's Complement, Internet Checksum). Framing: fixed-size framing, variable size framing. Flow control: flow control protocols. Noiseless channels: simplest protocol, stop-and-wait

SE (Information Technology) Syllabus (2019 Course)   25

HOD

Department of Information Technology
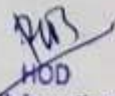Smt. Kashibai Navale College of Engineering
Vadgaon (BK.), Pune - 411 041

protocol.

Noisy channels: stop-and-wait Automatic Repeat Request (ARQ), go-back-n ARQ, Selective repeat ARQ, piggybacking.

Case Study	Draw PPPoE connection diagram with multiple devices, FFTH connection diagram	
Mapping of Course Outcomes for Unit II	CO2	
Unit III	Multi-Access Mechanism and Ethernet Standards	06 hrs

Random Access Techniques: CSMA, CSMA/CD, CSMA/CA, Controlled Access Techniques: Reservation, Polling, Token Passing, Channelization: FDMA, TDMA, CDMA, Ethernet: IEEE Standards- 802.3, 802.4, 802.5, 802.6 Comparison of Ethernet Standards: Standard Ethernet, Fast Ethernet, Gigabit Ethernet with reference to MAC layer and Physical Layer (Wired Network Only)

Case Study	Campus network design case study	
Mapping of Course Outcomes for Unit III	CO3	
Unit IV	Network Layer: Services and Addressing	06 hrs

Network Layer :Network Layer Services, IPv4 Addresses: Static and Dynamic Configuration Classful and Classless Addressing, Special Addresses, NAT, Subnetting, Supernetting, Delivery and Forwarding of IP Packet, Structure of Router, IPv4: Datagrams, Fragmentation, Options, Checksum, IPv6Addressing: Notations, Address Space, Packet Format, Transition from Ipv4 to IPv6

Case Study	Visit server room of campus and understand how IP addressing is done for your respective Campus →Institute→Department	
Mapping of Course Outcomes for Unit IV	CO4, CO5	
Unit V	Network Layer : Routing Protocols	06 hrs

Routing: Metric, Static vs Dynamic Routing Tables, Routing Protocol, Unicast Routing Protocols - Optimality Principle, Intra and Inter Domain Routing, Shortest Path Routing, Flooding, Distant Vector Routing, Link State Routing, Path Vector Routing Interior Gateway Routing Protocol- OSPF, EIGRP, RIP, Exterior Gateway Routing Protocol- BGP

Case Study	Case study on network simulation tools such as Packet tracer	
Mapping of Course Outcomes for Unit V	CO4	
Unit VI	TRANSPORT LAYER - SERVICES AND PROTOCOLS	06 hrs

Transport layer :Transport layer services(Duties), TCP: COTS, TCP header, Services, Segments, Connection Establishment, Flow control, Congestion Control, Congestion Control Algorithms, Leaky Bucket, Token Bucket and QoS, Timers, UDP: CLTS, UDP header, Datagram, Services, Applications, Socket: Primitives, TCP & UDP Sockets.

Case Study	Case study on Client server model using simple socket programming, Case Study on Transport Layer Security - Firewall (Stateless Packet

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Curriculum for Second Year of Information Technology (2019 Course), Savitribai Phule Pune University

	Filtering), Stateful, Application
Mapping of Course Outcomes for Unit VI	CO6

Text Books:

1. Behrouz A. Forouzan, TCP/IP Protocol Suite, McGraw Hill Education, ISBN: 978-0-07-070652-1, 4th Edition
2. Andrew S. Tanenbaum, David J. Wethrall, Computer Network, Pearson Education, ISBN: 978-0-13-212695-3

Reference Books:

1. Kurose Ross, Computer Networking: A Top Down Approach Featuring the Internet, Pearson Education, ISBN: 978-81-7758-878-1
2. Behrouz A. Forouzan, Data Communication and Networking, McGraw Hill Education, ISBN: 978-1-25-906475-3, 5th Edition
3. Mayank Dave, Computer Network, Cengage Learning, ISBN: 978-81-315-0986-9

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Savitribai Phule Pune University, Pune
Third Year Information Technology (2019 Course)
314455: Internship

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory (TH) : 4 hrs/week	04 Credit	Team work: 100 Marks

Prerequisite Courses: If Any

Course Objectives:

- To encourage and provide opportunities for students to get professional/personal experience through internships.
- To learn and apply the technical knowledge gained from academics /classroom learning in real life/industrial situations.
- To get familiar with various tools and technologies used in industries and their applications.
- To enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.
- To apply the experience gained from industrial internship to the academic course completion project.
- To nurture professional and societal ethics in students
- Understand the social, economic and administrative considerations that influence the working environment of industrial organizations

Course Outcomes:

On completion of the internship, learner will be able to –

CO1: Develop professional competence through industry internship.

CO2: Apply academic knowledge in a personal and professional environment

CO3: Build the professional network and expose students to future employees.

CO4: Apply professional and societal ethics in their day-to-day life.

CO5: Become a responsible professional having social, economic and administrative considerations.

CO6: Make own career goals and personal aspirations.

Guidelines:

Internships are educational and career development opportunities, providing practical experience in a field or discipline. Internships are far more important as the employers are looking for employees who are properly skilled and having awareness about industry environment, practices and culture. Internship is structured, short- term, supervised training often focused around particular tasks or projects with defined time scales.

Core objective is to expose technical students to the industrial environment, which cannot be simulated/experienced in the classroom and hence creating competent professionals in the industry and to understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

Engineering internships are intended to provide students with an opportunity to apply theoretical knowledge from academics to the realities of the field work/training. The following guidelines are proposed to give academic credit for the internship undergone as a part of the Third Year Engineering curriculum.

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Curriculum for Third Year of Information Technology (2019 Course), Savitribai Phule Pune University

Duration:

Internship to be completed after semester 5 and before commencement of semester 6 of at least 4 to 6 weeks; and it is to be assessed and evaluated in semester 6.

Internship work Identification:

Student may choose to undergo Internship at Industry/Govt./NGO/MSME/Rural Internship/ Innovation/IPR/Entrepreneurship. Student may choose either to work on innovation or entrepreneurial activities resulting in start-up or undergo internship with industry/NGO's/Government organizations/Micro/Small/ Medium enterprises to makethemselves ready for the industry.

Contacting various companies for Internship and Internship work identification process should be initiated in the Vth semester in coordination with training and placement cell/ industry institute cell/ internship cell. This will help students to start their internship work on time. Also, it will allow students to work in vacation period after their Vth semester examination.

Student can take internship work in the form of Online/onsite work from any of the following but not limited to:

- Working for consultancy/ research project,
- Participation at Events (Technical / Business)/in innovation related completions like Hackathon,
- Contribution in Incubation/ Innovation/ Entrepreneurship Cell/ Institutional Innovation Council/ startups cells of institute /
- Learning at Departmental Lab/Tinkering Lab/ Institutional workshop,
- Development of new product/ Business Plan/ registration of start-up,
- Participation in IPR workshop/Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos,
- Industry / Government Organization Internship,
- Internship through Internshala,
- In-house product development, intercollegiate, inter department research internship under research lab/group, micro/small/medium enterprise/onle ineinternship,
- Research internship under professors, IISC, IIT's, Research organizations,
- NGOs or Social Internships, rural internship,
- Participate in open source development.

Internship Diary/ Internship Workbook:

Students must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship Diary/workbook and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. Internship Diary/workbook may be evaluated on the basis of the following criteria:

- Proper and timely documented entries
- Adequacy & quality of information recorded
- Data recorded
- Thought process and recording techniques used
- Organization of the information

TE (Information Technology) Syllabus (2019 Course) 88

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Vadgaon, (Bk.), Pune - 411 041

Faculty of Engineering   Savitribai Phule Pune University

204183   **Electrical Circuits and Machines**

Credits: Th – 03, Pr -01

Teaching Scheme: **Examination Scheme:**

Theory: 03hrs/week   In-Sem(Online): 50 Marks
Practical: 02 hrs/week   End-Sem: (Theory): 50 Marks

                                                   Term Work: 25 Marks

Course Objectives:
- To analyse AC and DC networks with network simplification techniques.
- To gain basic knowledge of transformers and their types.
- To conduct experimental procedures on different types of electrical machines.
- To understand the constructional details, characteristics, features and application areas of various types of electric motors.

Course Outcomes:
On completion of the course, student will be able to
1. Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, and network theorems.
2. Explain the working principle of different electrical machines.
3. Select proper electrical motor for given application.
4. Design and analyze transformers.

Course Contents

Unit I :Basic Circuit Analysis and Simplification Techniques   (8 Hrs)
Kirchhoff's Current and Voltage Laws, Independent and dependent sources and their interconnection, power calculations.
Network Analysis: Mesh, Super mesh, Node and Super Node analysis. Source transformation and source shifting.
Network Theorems: Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems, Millers Theorem and its dual. (AC circuit analysis for all the topics of this unit)

Unit II :Transformer   (6 Hrs)
Types, Construction, Transformer on No-load (Transformation ratio, emf equation), impedance transformation, losses in transformer, regulation and efficiency, rating. Auto transformer, coupling transformer, Isolation transformer, C.T. and P.T., Design of single phase transformer for instrument power supply, High frequency transformers.

Unit III :DC Machines   (7 Hrs)
Construction of DC Machine, Motoring and generation action, types, EMF equation, Torque equation (Torque-armature current characteristics, Torque-speed characteristics, speed-armature current characteristics), Power flow diagram. Problems on speed, torque & losses. Different methods of speed control, different types of starters for DC shunt motor. Permanent Magnet DC motors, Applications of DC Motors

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Unit IV : AC Motors   (7 Hrs)

Three phase Induction motors, construction and principle of operation, types, slip and torque equation, Torque-slip characteristics, condition for maximum torque & ratios, types of starters, speed control, V/f control, Applications.

Synchronous motors: Construction, principle of operation, characteristics (V curves) and applications.

Unit V : Special Motors 1   (6 Hrs)

BLDC Motor, Construction, principle, characteristics, control circuit, sensors, applications. Construction, principle & applications of Reluctance Motor, Universal Motor.

Unit VI : Special Motors 2   (6Hrs)

Construction, types, principle, Characteristics, control circuit & applications of Stepper Motor and Servo motor.

Construction, principle, characteristics, Types and applications of single phase Induction Motor.

Text Books:

1. Abhijit Chakrabarti & Sudipta Debnath, "Electrical Machines",Tata McGraw-hill Publication.
2. William H Hayt, Jack E Kimmerly and Steven M. Durbin, "Engineering Circuit Analysis", TataMcGraw Hill.

Reference:

1. A.E. Fitzgerald, Charles Kingsley & Jr. Stephen D. Umans,"Electrical Machinery", TataMcGraw-hill Publication 6th Edition.
2. I.J Nagarath& D.P Kothari, "Electrical Machines", Tata McGraw-hill Publication 4th Edition.
3. T. J. E. Miller, "Brushless permanent-magnet and reluctance motor drives",OxfordUniversity Press(1989)
4. Ned Mohan, "Electric Machines and Drives": A first course, Wiley.
5. B. L. Theraja, "Electrical technology" volume 2, S. Chand

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204189   **Analog Communications**
                         Credits: Th – 03, Pr -01

Teaching Scheme: **Examination Scheme:**
Theory: 03hrs/week   In-Sem(Online): 50Marks
Practical: 02 hrs/week   End-Sem (Theory): 50 Marks

                                           Practical   : 50 Marks

Course Objectives:
The students are expected to demonstrate the ability to:
- Describe and analyze the mathematical techniques of generation, transmission and reception of amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM) signals.
- Evaluate the performance levels (Signal-to-Noise Ratio) of AM, FM and PM systems in the presence of additive white noise.
- Convert analog signals to digital format and describe Pulse and digital Modulation techniques.

Course Outcomes:
On completion of the course, student will be able to:

1. Understand and identify the fundamental concepts and various components of analogcommunication systems.
2. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
3. Describe analog pulse modulation techniques and digital modulation technique.
4. Develop the ability to compare and contrast the strengths and weaknesses of variouscommunication systems.

Course Contents

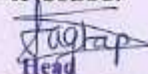**Unit I :AM Transmission**   **(8 Hrs)**
Base band & Carrier communication, Generation of AM (DSBFC) and its spectrum, Power relations applied to sinusoidal signals, DSBSC – multiplier modulator, Nonlinear generation, switching modulator, Ring modulator & its spectrum, Modulation Index. SSBSC, ISB & VSB, their generation methods & Comparison, Block Diagram of AM Transmitter and Broadcast technical standards.

Unit II :AM Reception   **(8 Hrs)**
Block diagram of TRF AM Receivers, Super Heterodyne Receiver, Dual Conversion Super heterodyne Receiver, Concept of Series & Parallel resonant circuits for Bandwidth & Selectivity. Performance Characteristics: Sensitivity, Selectivity, Fidelity, Image Frequency Rejection and IFRR. Tracking, Mixers. AM Detection: Rectifier detection, Envelope detection; Demodulation of DSBSC: Synchronous detection; Demodulation of SSBSC: Envelope detection

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Unit III : FM Transmission   (8 Hrs)

Instantaneous frequency, Concept of Angle modulation, frequency spectrum& Eigen Values, Narrow band & wide band FM, Modulation index, Bandwidth, Phase Modulation, Bessel's Function and its mathematical analysis, Generation of FM (Direct & Indirect Method), FM stereo Transmitter, Two way FM Radio Transmitter, Comparison of FM and PM.

Unit IV : FM Reception   (6 Hrs)

Block diagram of FM Receiver, FM Stereo Receiver , Two way FM Radio Receiver, FM detection using Phase lock loop(PLL) ,Slope detector, Balanced Slope detector etc.

Unit V :Noise   (6 Hrs)

Sources of Noise, Types of Noise, White Noise, Thermal noise, shot noise, partition noise, Low frequency or flicker noise, burst noise, avalanche noise, Signal to Noise Ratio, SNR of tandem connection, Noise Figure, Noise Temperature, Friss formula for Noise Figure, Noise Bandwidth, Behavior of Baseband systems and Amplitude modulated systems i.e.DSBSC and SSBSC in presence of noise.

Unit VI : Pulse Analog Modulation   (6 Hrs)

Band limited & time limited signals, Narrowband signals and systems, Sampling theorem in time domain, Nyquist criteria, Types of sampling- ideal, natural, flat top, Aliasing & Aperture effect. PAM PWM & PPM. Introduction to Pulse Code Modulation.

TextBooks:

1. George Kennedy, "Electronic Communication Systems" 5th Edition, McGraw-Hill.
2. Dennis Roddy &Coolen, "Electronic Communication",4th Edition, Prentice Hall.

Reference:

1. B. P. Lathi, "Modern Digital and Analog. Communication Systems", 3rd Edition, Oxford University Press.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons.
3. Taub& Schilling, "Principles of Communication Systems", Tata McGraw-Hill.
4. Frenzel, "Principles of Electronic Communication Systems"3rd Edition, Tata McGraw-Hill.

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MOOC / NPTEL Courses:

1. NPTEL Course **"Digital Circuits"**

   https://nptel.ac.in/courses/108/105/ 108105113/

2. NPTEL Course **"Digital Circuits & Systems"**

   https://nptel.ac.in/courses/117/106/117106086/

3. NPTEL Course **"Digital Electronic Circuits"**

   https://nptel.ac.in/courses/108/105/108105132/

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Second Year of Electronics / E & Tc Engineering (2019 Course)

204183: Electrical Circuits

Teaching Scheme:	Credit	Examination Scheme:
Theory: 03 hrs. / week	03	In-Sem (Theory): 30 Marks
		End Sem (Theory): 70 Marks

Prerequisite Courses, if any: 103004 - Basic Electrical Engineering

Companion Course, if any: 204187 - Electrical Circuits Laboratory

Course Objectives:
- To analyze simple DC and AC circuits with circuit simplification techniques.
- To formulate and analyze driven and source free RL and RC circuits.
- To formulate & determine network parameters for given network.
- To understand the constructional details, characteristics, features and application areas of various types of electric motors.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Analyze the simple DC and AC circuit with circuit simplification techniques.

CO2: Formulate and analyze driven and source free RL and RC circuits.

CO3: Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.

CO4: Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.

CO5: Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.

CO6: Analyze and select a suitable motor for different applications.

Course Contents		
Unit I	**Basic Circuit analysis & Simplification Techniques**	**(08 Hrs)**
Kirchhoff's Current and Voltage Laws, Independent and Dependent sources and their interconnection, power calculations. Network Analysis: Mesh, Super mesh, Node and Super Node analysis. Source transformation and source shifting. Network Theorems: Superposition, Thevenin's, Norton's and Maximum Power Transfer. (Analysis of simple DC circuits using all above techniques & Analysis of simple AC circuits using only Mesh analysis)		
Mapping of Course Outcomes for Unit I	CO1: Analyze the simple DC and AC circuit with circuit simplification techniques.	
Unit II	**Transient Analysis of Basic RL, RC and RLC Circuits**	**(07 Hrs)**
Initial conditions, Driven RL and RC circuits, source free RL and RC circuits, properties of exponential response, Natural and Forced response of RL and RC circuits. Introduction to driven & Source free series RLC circuit. Over damped and Under damped series RLC circuit.		
Mapping of Course Outcomes for Unit II	CO2: Formulate and analyze driven and source free RL and RC circuits.	
Unit III	**Two Port Network Parameters and Functions**	**(07 Hrs)**
Terminal characteristics of network, Z, Y, h, ABCD Parameters; Reciprocity and Symmetry conditions, Applications of the parameters. Application of Laplace Transforms to circuit analysis, network functions for one port and two port networks, poles and zeros of network functions and network stability.		
Mapping of Course Outcomes for Unit III	CO3: Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.	
Unit IV	**DC Machines**	**(08 Hrs)**
Construction, working principle, derivation of emf equation, types, voltage equation of DC generator. Working principle, derivation of Torque equation, types, voltage equation & speed equation of DC Motor. Basic characteristics & different methods of speed control of DC Shunt and Series motor, Power flow diagram of DC motor, Numericals on speed & torque. Need of starter, three point & four point starters for DC shunt motor, applications of DC Motors. **Permanent Magnet DC motors (PMDC): Construction, Working and applications.**		
Mapping of Course Outcomes for Unit IV	CO4: Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors. CO6: Analyze and select a suitable motor for different applications.	

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Unit V	AC Motors (Single phase & Three phase)	(08 Hrs)

Three phase Induction motors: Construction, working principle, types, concept of slip, effect of slip on rotor parameters, derivation of torque equation, condition for maximum torque, torque ratios, Torque-slip characteristics, Power flow diagram with numerical.

Single phase Induction motor: Construction, working principle, types and applications

Necessity of starters: Study of DOL & Star-Delta starters, speed control using V/f method, Applications.

Mapping of Course Outcomes for Unit V	CO4: Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.
	CO6: Analyze and select a suitable motor for different applications.

Unit VI	Special Purpose Motors	(06 Hrs)

BLDC Motor: Types, Construction, working principle, Bipolar control circuit, torque-speed characteristics and applications.

Stepper Motor: Types, Construction, working principle, different modes of operation, control circuit, applications.

Introduction to Electric vehicle, block diagram, case study of any one electric vehicle with respect to specifications of motor, battery and controller.

Mapping of Course Outcomes for Unit VI	CO5: Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.
	CO6: Analyze and select a suitable motor for different applications.

Learning Resources

Text Books:

1. Ravish R Singh, "Network Analysis & Synthesis", McGraw-Hill Education.
2. B.L. Theraja, A.K. Theraja, "Electrical Technology", Vol II, AC & DC Machines, S. Chand

Reference Books:

1. LJ Nagarath and D.P Kothari, "Electrical Machines", Tata McGraw-Hill Publication 4th Edition.
2. William H. Hayt, Jack E. Kimmerly and Steven M. Durbin, "Electrical Circuit Analysis", Tata McGraw Hill publication, 7th Edition.
3. V K Mehta and Rohit Mehta, "Principles of Electrical Machines", S Chand Publications.
4. A K Babu, "Electric & Hybrid Vehicle", Khanna Publishing.

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Second Year of Electronics / E & Tc Engineering (2019 Course)

204193: Principles of Communication Systems

Teaching Scheme:	Credit	Examination Scheme:
Theory: 03 hrs. / week	03	In-Sem (Theory): 30 Marks
		End Sem (Theory): 70 Marks

Prerequisite Courses, if any: --

Companion Course, if any: 204191 - Signals & Systems
204196 - Principles of Communication Systems Lab

Course Objectives:

- To equip/ familiarize students with basic mathematical tools for time and frequency domain analysis of communication signal and systems.

- To acquaint the students with the fundamental principles of modulation process and different amplitude and angle modulation systems.

- To introduce the students with the concept of Sampling theorem and pulse modulation techniques PAM, PWM, PPM.

- To impart pre-requisites of digital communication systems and explore digital representation techniques like PCM, DPCM, DM and ADM.

- To highlight the issues in baseband digital transmission such as data representation, synchronization, multiplexing and ISI.

Course Outcomes: On completion of the course, learner will be able to -

CO1: To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.

CO2: Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.

CO3: Explain generation and detection of FM systems and compare with AM systems.

CO4: Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).

CO5: Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).

CO6: Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.

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Course Contents		
Unit I	**Signals & spectra**	**(08 Hrs)**
Introduction to Communication System, Analog and Digital messages, regenerative repeaters, Signal Bandwidth & Power. Size & classification of signal, exponential Fourier series, concept of negative frequencies. Fourier transform and properties, Frequency shifting, Concept of baseband and bandpass signals, Signal transmission through LTI system. Signal energy & Energy Spectral density. Signal power & Power Spectral Density, Input and output PSD, PSD of modulated signal.		
Mapping of Course Outcomes for Unit I	CO1: To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.	
Unit II	**AM transmission & reception for signal tone**	**(08 Hrs)**
Need for frequency translation, Amplitude modulation (DSB-C), Double sideband Suppressed carrier (DSB-SC) modulation, Single sideband modulation (SSB), Vestigial Sideband modulation (VSB),Spectrum and Bandwidth of AM, DSB-SC, SSB & VSB, Calculation of modulation index for AM wave, Modulation index for more than one modulating signals, Power and power efficiency, AM reception		
Mapping of Course Outcomes for Unit II	CO2: Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.	
Unit III	**FM transmission & reception for signal tone**	**(08 Hrs)**
Phase Modulation (PM) and Frequency Modulation (FM), Relationship between Phase and Frequency Modulation, Modulation Index, Spectrum of FM (single tone): Feature of Bessel Coefficient, Power of FM signal, Bandwidth of tone modulated FM signal, modulation index : AM vs. FM, Spectrum of constant Bandwidth' FM, Narrowband and Wideband FM. FM Modulators and Demodulators: FM generation by Armstrong's Indirect method, frequency multiplication and application to FM, FM demodulator.		
Mapping of Course Outcomes for Unit III	CO3: Explain generation and detection of FM systems and compare with AM systems.	
Unit IV	**Pulse Modulation**	**(06 Hrs)**
Need of analog to digital conversion, sampling theorem for low pass signal in time domain, and Nyquist criteria, Types of sampling- natural and flat top. Pulse amplitude modulation & concept of TDM: Channel bandwidth for PAM, equalization, Signal Recovery through holding. Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM): Generation & Detection.		
Mapping of Course Outcomes for Unit IV	CO4: Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation techniques (PAM, PWM, and PPM)	

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Unit V	Digital Representation of Analog Signals	(06 Hrs)
Quantization of Signals: Quantization error, Uniform & Non-Uniform types of Quantization, Mid-rise & Mid-tread Quantizer. **Companding:** A-law & μ-law. **Pulse Code Modulation system:** Generation & Reconstruction, Differential Pulse code modulation, Delta Modulation, Adaptive Delta Modulation.		
Mapping of Course Outcomes for Unit V	**CO5:** Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).	

Unit VI	Baseband Digital Transmission	(06 Hrs)
Line codes: Properties and spectrum. **Digital Multiplexing and hierarchies:** T1, AT&T, E1, CCITT, Scrambling & Unscrambling. **Synchronization:** Carrier Synchronization, Bit Synchronization and Frame Synchronization. Intersymbol Interference, Equalization.		
Mapping of Course Outcomes for Unit VI	**CO6:** Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.	

Learning Resources

Text Books:

1. Taub, Schilling and Saha, "Principles of Communication Systems", McGraw-Hill, 4th Edition.
2. B P Lathi, Zhi Ding, "Modern Analog and Digital Communication System", Oxford University Press, 4th Edition.

Reference Books:

1. Bernard Sklar and Prabitra Kumar Ray, "Digital Communications Fundamentals and Applications", Pearson Education 2nd Edition.
2. Wayne Tomasi, "Electronic Communications System", Pearson Education, 5th Edition.
3. A.B Carlson, P B Crully and J C Rutledge, "Communication Systems", Tata McGraw Hill Publication, 5th Edition.
4. Simon Haykin, "Communication Systems",John Wiley & Sons, 4th Edition.

MOOC / NPTEL Course:

1. NPTEL Course "Principles of Communication Systems-I"

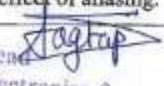https://nptel.ac.in/courses/108/104/108104091/

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Second Year of Electronics / E & Tc Engineering (2019 Course)

204195: Signals & Control System Lab

Teaching Scheme:	Credit	Examination Scheme:
Practical: 02 hrs. / week	01	Term Work: 50 Marks

Prerequisite Courses, if any: --

Companion Course, if any: 204192 - Signals & Systems
204193 - Control systems

SIGNALS & SYSTEMS

Note:- Attempt any six exercises from group A, eight exercises from group B and perform additional (min.3) tutorials using Virtual Lab.

	Group A
1.	Generate and plot the following signals in time domain and also sketch its amplitude and phase spectrum. Verify the result: • Impulse • Unit Step • Exponential • Unit ramp • Sinc • Rectangular
2 (a)	Write the codes to plot the following signals also simulate the signals: (a) $\sin(200\pi t)$ (b) $\sin(200\pi t + \frac{\pi}{6})$ (c) $\sin(200\pi t - \frac{\pi}{6})$ (d) $\cos(200\pi t)$ (e) $\cos(200\pi t + \frac{\pi}{4})$ (f) $\cos(200\pi t - \frac{\pi}{6})$
2 (b)	Develop codes to simulate, and plot the results for an exponential signal: $x(t) = k\,e^{-at}u(t)$ for the cases: (a) $k = 1$, and $a = 0.35$ (b) $k = 1.2$ and $a = -0.45$
3.	**Sampling & Aliasing** Consider various human voice / speech (probably your voice both male and female) or music signals. Try different sampling rates and observe the effect of aliasing.

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4.	**Real time speech signal and Spectral analysis**
	The speech signal has frequency components in the audio frequency range 300 Hz to 3400 Hz of the electromagnetic spectrum. Record the male and female voice speech Signal. Write a program to record the speech signals and sketch it in time domain, its amplitude spectrum and phase spectrum.
5.	The music signal has frequency components in the audio frequency range 20 Hz to 20000 Hz of the electromagnetic spectrum. Record or use the recorded music samples of different instruments (at least four) and Write a program to record the music signal and sketch it in time domain, its amplitude spectrum and phase spectrum. Also comment on the result.
6.	Find the convolution integral of Unit step and exponential signals and write a program to sketch the out response of the system. Also verify the commutative property of convolution integral.
7.	Take any one periodic signal and find its Fourier series coefficients using exponential or trigonometric FS method. Write a program to find its Fourier series coefficients. Also using FS coefficients, reconstruct the signal. Observe the effect of Gibb's phenomenon.

CONTROL SYSTEMS

Group B	
1.	Numerical on Black diagram reduction technique, Signal Flow Graphs (at least 4 numericals)
2.	Computation of transfer function of Electric Circuits, Mechanical Circuits for concept understanding with their analogy Force-Voltage and Force Current.
3.	Standard input signals and time response analysis of First Order and Second order Systems for step input. Underdamped, Critically damped and Overdamped case.
4.	Stability analysis for any given system with Characteristic Equation given (Software Simulation).
5.	Computation and Software / Simulation of root locus for given G(s)H(s). Comment on time domain specifications and stability of the system.
6.	Computation and analysis of frequency response analysis u Bode Plot for given G(s) H(s). Comment on Gain Margin, Phase Margin and Stability of the system.
7.	Software implementation/Simulation frequency response analysis using Nyquist Plot for given G(s) H(s). Comment on Gain Margin, Phase Margin and Stability of the system

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8.	Compute correlation time domain and frequency domain with examples (at least 4 numericals).
9.	Computation of State Model from Transfer function and Compute Transfer Function from state model solve at least 4/5 numericals.
10.	Derivation of Properties and solve numerical on state transition matrix.
11.	Observe the effect of P, PI, PD and PID controller on the step response of a feedback control system. Comment on effect of Controller mode Time domain specifications/ analysis.

Virtual LAB Link:

1. Signals and Systems Labotratory:
http://ssl-iitg.vlabs.ac.in/

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Second Year of Electronics / E & Tc Engineering (2019 Course)

204196: Principles of Communication Systems Lab

Teaching Scheme:	Credit	Examination Scheme:
Practical: 02 hrs. / week	01	Practical: 50 Marks

Prerequisite Courses, if any: —

Companion Course, if any: 204193 - Principles of Communication Systems

List of Laboratory Experiments

Group A: Hardware Practicals

1.	AM Generation (DSB-FC): Calculation of modulation index by graphical method, Power of AM Wave for different modulating signal and Observe Spectrum.
2.	Frequency modulator & demodulator using Varicap/Varactor Diode and NE 566 VCO, IC 565 (PLL based detection), calculation of modulation index & BW of FM.
3.	Verification of Sampling Theorem, PAM Techniques, (Flat top & Natural sampling), reconstruction of original signal, Observe Aliasing Effect in frequency domain.
4.	Generation and Detection of PWM using IC 555
5.	Study of PCM
6.	Study of Companded PCM
7.	Study of DM: Generation and detection
8.	Study of ADM: Generation and detection
9.	Study of line codes (NRZ, RZ, POLAR RZ, BIPOLAR (AMI), MANCHESTER) & their

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