University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus

7th Semester Syllabus for B.Tech
(Admission Batch 2022)

Electrical & Electronics Engineering									
B.Tech. 4th Year Course Structure									
7th Semester									
Sl No	**Type of Course**	**Subject Code**	**Subject Name**	**L**	**T**	**P**	**S**	**Total Conta**	**Credit Points**
Theory									
1	Professional Core Courses	PCC-EEE 701	Analog and digital Communication	2	1	0		3	3
2	Professional Elective Courses	PEC-EEE 701	A. Antennas and Propagation/ B. Embedded System/ C.VLSI Design	3	0	0		3	3
3	Open Elective Courses	OEC-EEE 701	A.Computer Networks/ B. Database Management Systems/ C. Artificial Intelligence and Machine Learning	3	0	0		3	3
4	Humanities and social sciences including Management	ESP(EE)701	Essential Studies For Professionals VII	2	0	0		2	0.5
PRACTICAL									
5	Professional Core Courses	PCC-EEE 791	Analog and digital Communication Laboratory	0	0	3		2	1
SESSIONAL									
6	Project. Seminar and Industrial Training	PW-EEE 781	Project stage-I				6	6	3
7	Project. Seminar and Industrial Training	PW-EEE 782	Internship I						4
8	Humanities and social sciences including Management	SDP781	Skill Development For Professionals VII				2	2	0.5
Value Added Courses									
9	Massive Open Online Courses (MOOCs)	MOOCS	Massive Open Online Courses (MOOCs)						
10	Industry and Foreign Certification (IFC)	IFC	Industry and Foreign Certification (IFC)						
11	Mandatory Additional Requirements (MAR)	MAR781	Mandatory Additional Requirements (MAR)						
Total Credit Points of Semester				**10**	**1**	**3**	**8**	**21**	**18**

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Syllabus and Lesson Plan for B.Tech Admission Batch 2022

Subject Name: Analog and digital Communication **Credit: 3** **Lecture Hours: 38**

Subject Code: PCCEEE701

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. Neeta Sahay

Pre-requisite: electronics (analog and digital), signals and systems, mathematics (especially calculus, probability, and Fourier transforms), and electromagnetics.

Course Objectives:

The purpose of learning this course is to-

1. Need for modulation and calculate the antenna size for different carrier frequencies
2. Compare between the different demodulation methods,
3. Identify the type of modulation, calculate the side-band frequencies
4. Calculate the Noise temperature & SNR for different systems
5. Sound knowledge on various digital communication systems.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1. Develop the generation and detection technique of analog communication system and analyze the different multiplexing techniques.
CO2. Examine the signal-to-noise ratio (SNR) performance of analog communications systems
CO3. Demonstrate the theory of probability and identify various complex program of communication system.
CO4. Execute the operation of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel.

Relevant Links:

Study Material	Coursera	NPTEL	LinkedIn Learning	**Infosys Springboard**

Detailed Syllabus:

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.	***International Academia:*** ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf) ***Industry Mapping:***	9	1. Measurement of modulation index of an AM signal. 2. Measurement of output power with varying modulation index an AM signal (for both DSB- & SSB). 3. Measurement of distortion of the demodulated output with varying modulation index of an AM signal (for both DSB-SC & SSB). 4. Measurement of power of different frequency components of a frequency modulated signal & the measurement of the bandwidth. 5.	Modern Digital and Analog Communication Systems, B. P. Lathi, OXFORD UNIVERSITY PRESS	1,3,4,9
					Communication systems (analog and digital) By Sanjay Sharma, S.K. Kataria & Sons	1,4
2	Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and De-emphasis, Threshold effect in angle modulation.	***International Academia:*** ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf) ***Industry Mapping:***	10	1. Design a PLL using VCO & to measure the lock frequency. 2. Design a FM demodulator using PLL. 3. Measurement of SNR of a RF amplifier. 4. Measurement of selectivity,sensitivity,fidelity of a superheterodyne receiver. 5. Study of waveforms of various functional points (output of RF,IF & video) of a B/W TV receiver. 6. 10. Study of the vertical & horizontal sweep of the time base unit of a B/W TV. 7.	Communication systems (analog and digital) By Sanjay Sharma, S.K. Kataria & Sons	1,3,4,6,8,9

3	Sampling process. Uniform and non-uniform quantizer. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers	***International Academia:*** ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf) ***Industry Mapping:***	8	1. 1. Design, implementation and study of all the properties of 7-length and 15-length pn sequences using shift register. 2. 2. Study of PAM and demodulation. 3. 3. Study of PCM and demodulation. 4. 4. Study of line coders: polar/unipolar/bipolar NRZ, RZ and Manchester. 5. 5. Study of delta modulator and demodulator. 6. 6. Study of adaptive delta modulator and demodulator.	Communication systems (analog and digital) By Sanjay Sharma, S.K. Kataria & Sons Modern Digital and Analog Communication Systems, B. P. Lathi, OXFORD UNIVERSITY PRESS	3,4 4
4	Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion. Baseband digital communication system. Passband Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying. Optimum demodulation of digital signals over band-limited channels-Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation.	***International Academia:*** ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf) ***Industry Mapping:***	11	1. 7. Study of BPSK modulator and demodulator. 2. 8. Study of BFSK modulator and demodulator. 3. 9. Study of ASK modulator and demodulator. 4. 10. Study of QPSK modulator and demodulator. 5. 11. Simulation study of probability of symbol error for BPSK modulation. 6. 12. Simulation study of probability of symbol error for BFSK modulation.	Communication systems (analog and digital) By Sanjay Sharma, S.K. Kataria & Sons	9, 10,11,13

Lesson Plan:

Module 1: Review of signals and systems Year 2025 , (Faculty : Neeta Sahay)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	Frequency domain representation of signals, -., ,.
2	Principles of Amplitude Modulation Systems
3	DSB, SSB and VSB modulations
4	DSB, SSB and VSB modulations
5	Angle Modulation
6	Representation of FM and PM signals
7	Representation of FM and PM signals
8	Spectral characteristics of angle modulated signals
9	Spectral characteristics of angle modulated signals

Module 2: Review of probability and random process. Year 2025 , (Faculty : Neeta Sahay)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	Gaussian and white noise characteristics
2	Gaussian and white noise characteristics
3	Noise in amplitude modulation systems
4	Noise in amplitude modulation systems
5	Noise in Frequency modulation systems
6	Noise in Frequency modulation systems
7	Pre-emphasis and De-emphasis
8	Pre-emphasis and De-emphasis
9	Threshold effect in angle modulation.
10	Threshold effect in angle modulation.

Module 3: Pulse modulation Year 2025 , (Faculty : Neeta Sahay)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	Sampling process.,., , ,
2	Pulse Amplitude and Pulse code modulation (PCM)
3	Pulse Amplitude and Pulse code modulation (PCM)
4	Differential pulse code modulation
5	Noise considerations in PCM
6	Time Division multiplexing
7	Digital Multiplexers
8	Delta modulation

Module 4: Elements of Detection Theory and Digital Modulation trade offs: Year 2025 , (Faculty : Neeta Sahay)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	Optimum detection of signals in noise
2	Coherent communication with waveforms
3	Probability of Error evaluations.
4	Baseband Pulse Transmission
5	Inter symbol Interference and Nyquist criterion
6	Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying
7	Quadrature Amplitude Modulation
8	Continuous Phase Modulation and Minimum Shift Keying
9	Optimum demodulation of digital signals over band-limited channels
10	Maximum likelihood sequence detection (Viterbi receiver).
11	Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**3**	**3**	**2**	**3**	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**
2	**1**	**1**	**3**	**3**	**3**	**1**	**3**	**3**	**1**	**3**	**-**	**1**
3	**2**	**3**	**3**	**2**	**1**	**3**	**2**	**-**	**1**	**-**	**1**	**-**
4	**3**	**2**	**2**	**2**	**3**	**3**	**-**	**3**	**3**	**-**	**-**	**3**

TEXT BOOK:

1. B. P. Lathi, Modern Digital and Analog Communication Systems, , OXFORD UNIVERSITY PRESS.
2. Sanjay Sharma, Communication systems (analog and digital) By, S.K. Kataria & Sons.

Reference Books

1. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
2. Wozencraft J. M. and Jacobs I. M., "Principles of Communication Engineering", John Wiley, 1965.
3. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication", Kluwer Academic Publishers, 2004.

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Syllabus for B. Tech Admission Batch 2022-2026

Subject Name: Antennas and Propagation **Credit: 3** **Lecture Hours: 41**

Subject Code: PEC-EEE 701A

Study material	Coursera	nptel	LinkedIn Learning	Infosys Springboard

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. NA

Pre-requisite: Electromagnetic Field Theory

Course Objective(s):

The purpose of learning this course is to-

Serial No	Course Objective
1	Learn about the properties and various types of antennas
2	Analyze the properties of different types of antennas and their design.
3	Able to operate antenna design software tools and to be able to design the antenna of required specifications.

Detailed Syllabus

Module No.	Description	Number of Lectures	Corresponding Lab Assignment	Text Book	Chapter Mapped
1	Fundamental Concepts- Physical concept of radiation, Radiation pattern, near-and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.	5	NA	J.D. Kraus, Antennas, McGraw Hill, 1988.	1,2
2	Radiation from Wires and Loops- Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.	5	NA	J.D. Kraus, Antennas, McGraw Hill, 1988.	5,6
3	Aperture and Reflector Antennas-Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and casse grain antennas.	5	NA	J.D. Kraus, Antennas, McGraw Hill, 1988.	7,8
4	Broadband Antennas- Log-periodic and Yagi-Uda antennas, frequency independent antennas, broadcast antennas.	4	NA	J.D. Kraus, Antennas, McGraw Hill, 1988.	15
5	Micro strip Antennas- Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.	5	NA	J.D. Kraus, Antennas, McGraw Hill, 1988.	16
6	Antenna Arrays-Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, synthesis of antenna arrays using Schelkun off polynomial method, Woodward-Lawson method.	5	NA	J.D. Kraus, Antennas, McGraw Hill, 1988.	11
7	Basic Concepts of Smart Antennas-Concept and benefits of smart antennas, fixed weight beam forming basics, Adaptive beam forming.	4	NA	J.D. Kraus, Antennas, McGraw Hill, 1988.	11
8	Different modes of Radio Wave propagation used in current practice.	2	NA	J.D. Kraus, Antennas, McGraw Hill, 1988.	1

Course outcomes:

At the end of the course, the students will be able to

CO1. Remember various antenna parameters
CO2. Understand the properties and various types of antennas
CO3. Apply different techniques for antenna parameter measurement
CO4. Analyze radiation patterns of antennas and evaluate antennas for given specifications

Suggested Learning Resources:

Text Books

1. J.D. Kraus, Antennas, McGraw Hill, 1988.

Reference Books

2. C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley, 1982.
3. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.
4. R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw Hill, 1984.
5. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980.
6. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill, 2005.
7. R.E. Crompton, Adaptive Antennas, John Wiley.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	0	1	0	0	0	1	0	0
CO2	3	0	1	1	0	1	0	0	0	1	0	0
CO3	2	3	1	2	0	0	0	0	0	0	0	0
CO4	2	0	0	0	0	0	0	0	0	1	0	0

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Syllabus and Lesson Plan for B.Tech Admission Batch 2022

Subject Name: Embedded System **Credit: 3** **Lecture Hours: 40**

Subject Code: PECEEE701B

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. Prof. Rajat Shubhra Pal

Pre-requisite:

Analog Electronics, Digital Electronics, Microprocessor and Microcontroller.

Course Objective:

1. Able to design and use advanced controllers in real-life situations.
2. Able to design the interfacing of the systems with other data handling / processing systems.
3. Able to operate antenna design software tools and to be able to design the antenna of required specifications.

Course Outcome:

At the end of the course, the students will be able to

CO1. Understand the concept of embedded system, microcontroller, different components and their interactions
CO2: Get familiarized with programming environment to develop embedded solutions
CO3. Design interfacing of the systems with other data handling / processing systems.
CO4. Appreciate engineering constraints like energy dissipation, data exchange speeds etc.

Relevant Links:

Study Material	Coursera	Nptel	LinkedIn Learning:	Infosys Springboard:

Detailed Syllabus:

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	The concept of embedded systems design, Embedded microcontroller cores, embedded memories. Examples of embedded systems.	***International Academia:*** 6.08: Intro to EECS via Interconnected Embedded Systems | MIT Admissions ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG- 1/ug-vol1.pdf) ***Industry Mapping:*** *Microcontroller, Arduino, ARM Processor*	8	NA	R. Kamal, "Embedded Systems", McGraw Hill, 2020	1,2
2	Technological aspects of embedded systems: interfacing between analog and digital blocks, signal conditioning, digital signal processing.	***International Academia:*** 6.08: Intro to EECS via Interconnected Embedded Systems | MIT Admissions ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG- 1/ug-vol1.pdf) ***Industry Mapping:*** *Microcontroller, Arduino, ARM Processor*	8	NA	R. Kamal, "Embedded Systems", McGraw Hill, 2020	3,4

3	Sub-system interfacing, interfacing with external systems, user interfacing.	***International Academia:*** 6.08: Intro to EECS via Interconnected Embedded Systems | MIT Admissions ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG- 1/ug-vol1.pdf) ***Industry Mapping:*** *Microcontroller, Arduino, ARM Processor*	8	NA	J.W. Valvano, "Embedded Microcomputer System: Real Time Interfacing", Cengage Learning India Private Limited, 2011	3,7-9
4	Design tradeoffs due to process compatibility, thermal considerations, etc.	***International Academia:*** 6.08: Intro to EECS via Interconnected Embedded Systems | MIT Admissions ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG- 1/ug-vol1.pdf) ***Industry Mapping:*** *Microcontroller, Arduino, ARM Processor*	8	NA	R. Kamal, "Embedded Systems", McGraw Hill, 2020	7
5	Software aspects of embedded systems: real time programming languages and operating systems for embedded systems.	***International Academia:*** 6.08: Intro to EECS via Interconnected Embedded Systems | MIT Admissions ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG- 1/ug-vol1.pdf) ***Industry Mapping:*** *Microcontroller, Arduino, ARM Processor*	8	NA	R. Kamal, "Embedded Systems", McGraw Hill, 2020	8-10

Lesson Plan:

Module 1: Year 2025 , (Faculty : Rajat Shubhra Pal)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	The concept of embedded systems design,
2	Hardware units and device, embedded software
3	Design process in embedded system
4	Classification and example
5	8-bit microcontroller, real world interfacing
6	Memory type, memory maps and addresses
7	Processor and memory organization
8	Processor and memory selection

Module 2: Year 2025 , (Faculty : Rajat Shubhra Pal)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	IO types and example
2	Serial communication devices,
3	Parallel device ports
4	Wireless devices
5	Timer and counter, watchdog timer, real time clock
6	Bus communication protocols
7	Interrupt service mechanism
8	Digital signal processing.

Module 3: Year 2025 , (Faculty : Rajat Shubhra Pal)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	Introduction and definition
2	RS232 specification
3	SCI software interface
4	Synchronous transmission and receiving using the SPI
5	Input switches and keyboards
6	Output LEDs
7	Computer controlled relays and DC motor
8	Memory interface example

Module 4: Year 2025 , (Faculty : Rajat Shubhra Pal)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	Multiple process in an application
2	Multiple threads in an application
3	Task, states and data
4	Concept of semaphores
5	Interprocess communication
6	Massage queue, mailbox, pipe, socket function
7	Design tradeoffs due to process compatibility
8	Thermal considerations, etc.

Module 5: Year 2025 , (Faculty :Rajat Shubhra Pal)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	Real time OS, Process management
2	Timer function, event function
3	Memory management
4	Device file and IO subsystem management
5	Interrupt routine in RTOS
6	Basic design using an RTOS
7	RTOS task scheduling model
8	OS security issue

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	0	0	0	0	1	0	1
CO2	2	2	3	2	3	0	0	0	0	1	0	1
CO3	3	2	3	2	3	0	0	0	0	2	1	2
CO4	2	2	2	3	2	2	2	1	1	1	1	2

TEXT BOOK:

1. R. Kamal, “Embedded Systems”, McGraw Hill, 2020
2. J.W. Valvano, "Embedded Microcomputer System: Real Time Interfacing", Cengage Learning India Private Limited, 2011.

REFERENCE BOOKS:

1. Jack Ganssle, "The Art of Designing Embedded Systems", Newness, 1999.
2. V.K. Madisetti, "VLSI Digital Signal Processing", IEEE Press (NY, USA), 1995.
3. David Simon, "An Embedded Software Primer", Addison Wesley, 2000.
4. K.J. Ayala, "The 8051 Microcontroller: Architecture, Programming, and Applications", Penram Intl, 1996.

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Syllabus and Lesson Plan for B.Tech Admission Batch 2022

Subject Name: VLSI Design **Credit: 3** **Lecture Hours: 33**

Subject Code: PECEEE701C

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. Pratik De Sarkar

Pre-requisite: Analog Electronics circuits and Digital Logic Circuits

Course Objective:
1. Able to use tools for VLSI IC design.
2. Analyze of CMOS digital electronic circuits.

Course Outcome:

CO1. Understand the basic Physics and Modeling of MOSFETs.
CO2: Learn the basics of Fabrication and Layout of CMOS Integrated Circuits
CO3: Use tools for VLSI IC design.
CO4. Analysis of CMOS digital electronic circuits

Relevant Links:

Study Material	Coursera	Nptel	LinkedIn Learning:	Infosys Springboard

Detailed Syllabus:

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	Fundamental concepts and structures of designing digital VLSI systems. CMOS devices and circuits, standard CMOS fabrication processes, CMOS design rules, static and dynamic logic structures interconnect analysis, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies, VLSI architecture.	International Academia: https://ocw.mit.edu/courses/res-tll-004-stem-concept-videos-fall-2013/ Industry Mapping: Verilog	17		1. Kang, Leblebici, CMOS Digital Integrated Circuits Analysis & Design, 3rd Edition, PHI	3, 5, 7, 8, 10, 12
2	VLSI Design flow-Design entry: Schematic, FSM & HDL, different modeling styles in Verilog, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation Verilog constructs and codes for combinational and sequential circuits.	International Academia: https://ocw.mit.edu/courses/res-tll-004-stem-concept-videos-fall-2013/ Industry Mapping: Verilog	16		1. Kang, Leblebici, CMOS Digital Integrated Circuits Analysis & Design, 3rd Edition, PHI	4, 9, 11

Lesson Plan:

Module 1: Fundamental concepts Year 2025 , (Faculty :Mr. Pratik De Sarkar)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	Fundamental concepts
2	Structures of designing digital VLSI systems.
3	CMOS devices,
4	CMOS circuits,
5	standard CMOS fabrication processes,
6	CMOS design rules,
7	static logic structures interconnect analysis,
8	dynamic logic structures interconnect analysis,
9	CMOS chip layout,
10	simulation,
11	Testing
12	low power techniques,
13	design tools
14	Methodologies
15	VLSI architecture.

Module 2: VLSI Design flow Year 2025 , (Faculty :Mr. Pratik De Sarkar)

WORKING DAY	LESSON PLAN – DESCRIPTION
1	VLSI Design flow-
2	VLSI Design entry
3	Schematic,
4	FSM & HDL,
5	different modeling styles in Verilog,
6	Data types and objects,
7	Dataflow,
8	Behavioral Modeling,
9	Structural Modeling,
10	Synthesis Verilog constructs
11	Simulation Verilog constructs
12	codes for combinational circuits.
13	codes for sequential circuits.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1	3	1	2	0	0	0	0	0	0	3
CO 2	2	2	3	1	1	0	0	0	0	0	0	2
CO 3	3	1	1	0	3	0	0	2	3	0	3	3
CO 4	3	3	3	0	3	0	0	0	2	0	2	3

Text Books

1. Kang, Leblebici, CMOS Digital Integrated Circuits Analysis & Design, 3rd Edition, PHI.

Reference Books

1. N.H.E. Weste and D.M. Harris, CMOS VLSI design: A Circuits and Systems Perspective, 4th Edition, Pearson Education India, 2011.
2. C. Mead and L. Conway, Introduction to VLSI Systems, Addison Wesley, 1979.
3. L. Glaser and D. Dobberpuhl, The Design and Analysis of VLSI Circuits, Addison Wesley, 1985.
4. V.K. Madisetti, "VLSI Digital Signal Processing", IEEE Press (NY, USA), 1995.

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Syllabus and Lesson Plan for B.Tech Admission Batch 2022

Subject Name: Conputer Networks **Credit: 3**
Lecture Hours: 33 **Subject Code: OECEEE701A**

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

Pre-requisite:

1. Analog Communication
2. Digital Communication
3. Wireless Networks
4. Embedded systems
5. Operating Systems

Course Objective:

To expose the students to the following:

1. Learn the functions of the different layer of the OSI Protocol.
2. Able to draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
3. Able to develop the network programming for a given TCP/IP protocol.

Course Outcome:

Upon completion of this course, students should be able to:

1. CO1: Remember functional block diagram of different network.
2. CO2: Explain the functions of the different layer of the OSI Protocol
3. CO3: Apply TCP/IP protocol for the network programming
4. CO4: Analyze the configuration of DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open-source available software and tools

Relevant Links:

Coursera Hyperlinked	Nptel	LinkedIn Learning:	**Infosys Springboard:**

Detailed Syllabus:

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.	Academic Mapping: CTE Model Curriculum for (aicte-india.org) **Industry Mapping:**	7		Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill	Ch 1, Ch 2
2	Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.	Academic Mapping: CTE Model Curriculum for (aicte-india.org) **Industry Mapping:**	8		Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill	Ch 10, Ch 11, Ch 12, Ch 13, Ch 14, Ch 15, Ch 16, Ch 17, Ch 18

3	Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.	Academic Mapping: CTE Model Curriculum for6(aicte-india.org) **Industry Mapping:**	6		Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill	Ch 19, Ch 20, Ch 21, Ch 22
4	Transport Layer-Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.	Academic Mapping: CTE Model Curriculum for (aicte-india.org) **Industry Mapping:**	6		Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill	Ch 23, Ch 24
5	Application Layer-Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.	Academic Mapping: CTE Model Curriculum for (aicte-india.org) **Industry Mapping:**	6		Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill	Ch 25, Ch 26, Ch 27, Ch 29

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	0	1	1	1	1	0	1
CO2	3	3	2	2	2	1	1	1	1	1	0	1
CO3	3	3	2	2	2	0	1	1	0	1	0	1
CO4	3	2	2	2	2	1	0	1	0	1	0	1

TEXT BOOK:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill.

REFERENCE BOOKS:

1. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
2. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
3. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
4. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town
Campus University of Engineering & Management, Jaipur

Syllabus for B.Tech Admission Batch 2022

Subject Name: Database Management Systems **Credit: 3** **Lecture Hours: 36**
Subject Code: OECEEE701B

Pre-requisite: Fundamental concepts of set theory and designing.
Relevant Links: Study material Coursera NPTEL Linkedin Learning InfosysSpringboard

Course Objectives:

1. To introduce database systems, data models, database languages and the diagrammatic approach to design database systems.
2. To introduce the logical and mathematical formulation concept on database systems and further extend these concept towards learning database implementation languages.
3. To develop understanding on relational database design.
4. To understand the internal operations on a database systems and the storage architecture of data concepts.

Course Outcomes:

CO1: Students will have a proper understanding on database system and design.
CO2: Students will learn the concepts of database designing using logical and mathematical concepts like relational algebra and calculus which further will be extended to learning of SQL.
CO3: Students will gather the understanding of relation database design through the concept of normalization.
CO4: Students will learn the internals of DBMS through proper understanding of transaction and further the storage architecture of data for a database system.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment		
1	**Introduction to database systems and Entity-Relationship Model**	Concept & Overview of DBMS, Data Models Database Languages, E-R modelling - Basic concepts, Design Issues, Mapping Constraints Keys, Entity-Relationship Diagram Weak Entity Sets, Extended E-R features	***International Academia:*** 1. https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/ 2. https://ocw.mit.edu/courses/6-5830-database-systems-fall-2023/ ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/AICTE%20-%20UG%20CSE.pdf*** ***Industry Mapping:*** ***Star UML Downloading link*** https://staruml.io/download/ Diagram design online using Draw.io https://app.diagrams.net/	10L	Designing of E-R modelling using Star UML or any other standard designing software.	Database System Concepts, Silberschatz, Korth and Sudarshan, McGraw-Hill, 6th and 7th editions	1, 2, 3, 4, 6, 7, 8, 11, 14, 15, 16

2	**Introduction to Relational Model and SQL & Integrity Constraints**	Structure of relational Databases, Relational Algebra operations, examples and exercise Relational Calculus - operations, examples and exercise Extended Relational Algebra Operations, Views, Modifications Of the Database Concept of database languages - DDL, DML, DCL Basic Structure, Set operations, Aggregate Functions, Null Values Domain Constraints, Referential Integrity Constraints, assertions, views Joins Nested Sub-queries Stored procedures and triggers, Overview of Query Optimization	***International Academia:*** 1. https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/ 2. https://ocw.mit.edu/courses/6-5830-database-systems-fall-2023/ ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/AICTE%20-%20UG%20CSE.pdf*** ***Industry Mapping:*** ORACLE10g https://www.oracle.com/in/database/technologies/xe-downloads.html	14L	Queries on the following – 1. Tablecreation. 2. Data insertion, deletion, updation in table. 3. Aggregation functions on data. 4. Concepts of keys in table. 5. Concept of Joins. 6. Sub-quries & Nested subqueries. 7. PL SQL programming. 8. Stored procedures and triggers – concept. Some of the sample queries- https://docs.google.com/document/d/1Pbg5YkwTHC11qqjjMvbNcDHxR-2TMIb1/edit?usp=drive_link&ouid=107146940537629597388&rtpof=true&sd=true	Fundamentals of Database Systems, Elmasri and Navathe, Pearson, 6th edition	1, 2, 3, 5, 6, 7, 8, 14, 15, 16, 17, 20, 21

3	**Relational Database Design**	Functional Dependency, Equivalence of functional dependency Canonical Cover Keys, types of keys, finding no. of candidate keys Normalization using functional dependencies – 1NF,2NF,3NF,BCNF,multivalued dependencies - concept of4NF, 5NF Decomposition using normal forms Lossless or Lossy decomposition	***International Academia:*** 1. https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/ 2. https://ocw.mit.edu/courses/6-5830-database-systems-fall-2023/ ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/AICTE%20-%20UG%20CSE.pdf*** ***Industry Mapping:*** ORACLE10g https://www.oracle.com/in/database/technologies/xe-downloads.html	10L		Database Management System (DBMS): A Practical Approach, Chopra Rajiv, S. Chand Publishing, 3rd and 5th editions	1, 4, 5, 6, 7, 8

4	**Internals of RDBMS And File Organization & Index Structures**	Concept of transactions and schedules, ACID properties Transaction processing, Concurrency control – conflict and view serializability Recovery Management : transaction model properties, state serializability, lock base protocols, two phase locking File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes Dynamic Multilevel Indexes using B tree and B+ tree	***International Academia:*** 1. https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/ 2. https://ocw.mit.edu/courses/6-5830-database-systems-fall-2023/ ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/AICTE%20-%20UG%20CSE.pdf*** ***Industry Mapping:*** ORACLE10g https://www.oracle.com/in/database/technologies/xe-downloads.html	12L			

Module-1 Introduction to database systems and Entity- Relationship Model (Faculty: Prof. Pratik De Sarkar)

Working Day	Topics
1	
2	
3	Concept & Overview of DBMS
4	Data Models
5	Database Languages, Database Administrator
6	E-R modelling - Basic concepts, Design Issues, Mapping Constraints Keys
7	Entity-Relationship Diagram
8	Weak Entity Sets
9	Extended E-R features

Module-2 Introduction to Relational Model and SQL & Integrity Constraints (Faculty: Prof. Pratik De Sarkar)

Working Day	Topics
1	Structure of relational Databases
2	Relational Algebra operations, examples and exercise
3	Relational Calculus - operations, examples and exercise
4	Extended Relational Algebra Operations, Views
5	Modifications Of the Database
6	Concept of database languages - DDL, DML, DCL
7	Basic Structure
8	Set operations
9	Aggregate Functions
10	Null Values, Domain Constraints
11	Referential Integrity Constraints, assertions, views
12	Joins, Nested Sub-queries
13	Stored procedures and triggers, Overview of Query Optimization

Module-3 Relational Database Design (Faculty: Prof. Pratik De Sarkar)

Working Day	Topics
1	Functional Dependency
2	Different anomalies in designing a Database Armstrong axioms
3	Closure of attribute set Equivalence of functional dependency Canonical Cover
4	Keys, types of keys, finding no. of candidate keys
5	Normalization using functional dependencies –1NF, 2NF, -3NF, BCNF
6	Multivalued dependencies - concept of 4NF
7	Multivalued dependencies - concept of 5NF
8	Decomposition using normal forms Lossless decomposition
9	Decomposition using normal forms Lossy decomposition

Module-4 Internals of RDBMS and File Organization & Index Structures (Faculty: Prof. Pratik De Sarkar)

Working Day	Topics
1	Concept of transactions and schedules
2	ACID properties, Transaction processing
3	Concurrency control – conflict and view serializability
4	Recovery Management: transaction model properties
5	State serializability
6	Lock base protocols, Two phase locking
7	File & Record Concep
8	Placing file records on Disk
9	Fixed and Variable sized Records
10	Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes
11	Dynamic Multilevel Indexes using B tree and B+ tree

Text Books:

1. Database System Concepts, Silberschatz, Korth and Sudarshan, McGraw-Hill, 6th and 7th editions

2. Fundamentals of Database Systems, Elmasri and Navathe, Pearson, 6th edition
3. Database Management System (DBMS): A Practical Approach, Chopra Rajiv, S. Chand Publishing, 3rd and 5th editions

Syllabus and Lesson Plan for B.Tech Admission Batch 2022-2026

Subject Name: AI & ML **Credit: 3** **Lecture Hours: 40**

Subject Code: OEC-EEE 701C

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. Prof. Dr. Tanmay Sinha Roy

Pre-requisite: (1) Design and Analysis of Algorithms, Data Structures and Algorithms (2) Basic concepts from Mathematics & Statistics (Linear Algebra, and Statistics and Probability, Calculus) (3) Programming in Python/R

Course Objectives:

1. To introduce the concept of Classical Artificial Intelligence techniques and agents to achieve desired objectives.
2. To introduce and familiarize the students with the various searching algorithms relevant for Artificial Intelligence.
3. Introduce and apply the concepts of Knowledge Representation and Reasoning methodologies.
4. Introduce the details of the various planning techniques important for building artificial intelligence systems
5. Introduce Expert Systems using the concepts of representing and usage of domain knowledge in the respective areas of applications.
6. To understand how Machine learning techniques are used to make computers learn from from data and experience, a vast variety of application areas, from spam filters, medical imaging, analyze customer purchase data, or to detect fraud in credit card transactions.
7. To discover patterns in your data and then make predictions based on often complex patterns to answer business questions, detect and analyse trends and help solve problems.
8. To understand and appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and unsupervised learning and be able to design and implement various machine learning algorithms in a range of real-world application.

Course Outcomes:

CO1: Understand the basic concepts and techniques of Artificial Intelligence and Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.

CO2: Apply AI algorithms for solving practical problems, using tools of logic and knowledge representation

CO3: Planning - planning with state space search, partial order, graphs, with propositional logic, Analysis of planning approaches, Hierarchical planning, conditional planning, Continuous and Multi Agent planning

CO4: Explain Expert System and implementation and be able to design and implement various machine learning algorithms in a range of real-world application

Relevant Links:

Study Material	**Coursera Hyperlinked**	**Nptel**	**LinkedIn Learning:**	**Infosys Springboard:**

Detailed Syllabus:

Module number	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Text Book	Mapped Chapter
1	**Introduction** Artificial Intelligence and its applications, Components of Artificial Intelligence (AI), Artificial Intelligence Techniques, Level of models, criteria of success, Intelligent Agents, Nature of Agents, Learning Agents, advantages and limitations of AI, Impact and Examples of AI, Application domains of AI.	**AICTE prescribed syllabus:** https://www.aicteindia.org/sites/default/files/UG_Eme rging.pdf International Academia: **(1) MIT:** https://ocw.mit.edu/courses/6034 artificial intelligencefall 2010/resources/lecture 1introduction and scope/Industry (2) **Stanford Univ.:** https://stanford-cs221.github.io/spring2024/ **IITs:**	4		Artificial Intelligence - by Rich and Knight (McGraw Hill)	Chapter-1

		1. **IIT Kanpur**: https://cse.iitk.ac.in/users/cs365/2008/syllabus.html 2. **IIT Bombay:** **https://www.cse.iitb.ac.in/~siva/talks/cs621intro.pdf** **https://www.ieor.iitb.ac.in/acad/courses/ie703** **Coursera** **https://www.coursera.org/learn/introduction-to-ai** **Nptel** **https://nptel.ac.in/courses/106102220**			Artificial Intelligence – by Saroj Kaushik (Cengage)	
2	**AI Search & Optimization Algorithms** *Uninformed Search Algorithms* Depth First Search, Breadth-First Search, Depth-Limited Search, Uniform Cost Search. *Informed Search Algorithms* Greedy Search Algorithm, A* Search Algorithms, Graph Search. *Local Search Algorithms* Tabu Search, Hill Climbing Algorithms, Simulated Annealing, Genetic Algorithms, Local Beam Search. *Swarm Intelligence Algorithms* Ant Colony Optimization (ACO), Particle Swarm Optimization (PSO), Artificial Bee Colony (ABC) Algorithm. *Adversarial Search Algorithms* Minimax Algorithm, Alpha-Beta Pruning.	**AICTE prescribed syllabus:** https://www.aicteindia.org/sites/default/files/UG_Eme rging.pdf International Academia: **(1) MIT:** https://ocw.mit.edu/courses/6034 artificial intelligencefall 2010/resources/lecture 1introduction and scope/Industry (2) **Stanford Univ.:** https://stanford-cs221.github.io/spring2024/ **IITs:** 3. **IIT Kanpur**: https://cse.iitk.ac.in/users/cs365/2008/syllabus.html 4. **IIT Bombay:** **https://www.cse.iitb.ac.in/~siva/talks/cs621intro.pdf** **https://www.ieor.iitb.ac.in/acad/courses/ie703** **Coursera** **https://www.coursera.org/learn/introduction-to-ai** **Nptel** **https://nptel.ac.in/courses/106102220**	12		Artificial Intelligence and Soft Computing – by Amit Konar (CRC Press)	Chapter-4

3	**Introduction to Machine Learning** Defining machine learning, its types (supervised, unsupervised, reinforcement), and its applications. Neural Networks Perceptron, Single Layer Perceptron, Multilayer Perceptron, Classifier Evaluation, Ensemble Learning, Boosting.	**Coursera** **https://www.coursera.org/specializations/machine-learning-introduction** **Nptel** **https://nptel.ac.in/courses/106106139**	8		Machine Learning - Tom Mitchell (TM) (publ. by McGraw Hill) Pattern Classification - Duda, Hart and Stork (DHS) (Wiley, 2nd edn.)	TM, DHS Chapter-1 DHS Chapter-2, 3, 6, 7, 8, 9.
4	**Supervised and Unsupervised Machine Learning Algorithms** Decision Tree, Bayesian Networks, Bayes Classifier, Linear Regression, Logistic Regression, k-Nearest Neighbour Learning, Support Vector Machines, Random Forest Classifier. Clustering, K-Means Clustering Dimensionality Reduction, Reinforcement Learning.	**Coursera** **https://www.coursera.org/specializations/machine-learning-introduction** **Nptel** **https://nptel.ac.in/courses/106106139**	12		Machine Learning - Tom Mitchell (TM) (publ. by McGraw Hill) Pattern Classification - Duda, Hart and Stork (DHS) (Wiley, 2nd edn.)	DHS Chapter-3, 5, 6. 9, 10 TM Chapter-4, 5, 13.
5	**Introduction to Deep Learning** Kernels in CNN Model, Hyper-Parameters, CNN Model Architecture, AlexNet, LeNet, VGG Networks, Google Network, Residual Networks.	**Coursera** **https://www.coursera.org/specializations/deep-learning** **Nptel** **https://nptel.ac.in/courses/106105215**	4		Artificial Intelligence and Soft Computing – by Amit Konar (CRC Press)	

Lesson Plan:

Module 1: Introduction to Artificial Intelligence and its applications: 3rd Year, (Faculty : Prof. Dr. Tanmay Sinha Roy)

WORKING DAY	LESSON PLAN – DESCRIPTION
Day 1	Artificial Intelligence and its applications, Components of Artificial Intelligence.
Day 2	Artificial Intelligence Techniques, Level of models, criteria of success, Intelligent Agents.
Day 3	Nature of Agents, Learning Agents, advantages and limitations of AI.
Day 4	Impact and Examples of AI, Application domains of AI.

Module 2: AI Search & Optimization Algorithms: 3rd Year, (Faculty : Prof. Dr. Tanmay Sinha Roy)

WORKING DAY	LESSON PLAN – DESCRIPTION
Day 1	Uninformed Search Algorithms-Depth First Search
Day 2	Breadth-First Search, Depth-Limited Search
Day 3	Uniform Cost Search
Day 4	Informed Search Algorithms- Greedy Search Algorithm
Day 5	A* Search Algorithms, Graph Search
Day 6	Local Search Algorithms-Tabu Search
Day 7	Hill Climbing Algorithms
Day 8	Simulated Annealing, Genetic Algorithms (GAs)
Day 9	Swarm Intelligence Algorithms-Ant Colony Optimization (ACO)
Day 10	Particle Swarm Optimization (PSO), Artificial Bee Colony (ABC) Algorithm, Local Beam Search
Day 11	Adversarial Search Algorithms-Minimax Algorithm
Day 12	Alpha-Beta Pruning.

Module 3: Introduction to Machine Learning: 3rd Year, (Faculty : Prof. Dr. Tanmay Sinha Roy)

WORKING DAY	LESSON PLAN – DESCRIPTION
Day 1	Machine Learning Fundamentals, Learning Paradigms
Day 2	Concept Learning
Day 3	Decision Tree
Day 4	Bayes Classifier
Day 5	Bayesian Networks
Day 6	Linear Regression, Logistic Regression
Day 7	Computational Learning Theory
Day 8	k-Nearest Neighbour Learning
Day 9	Support Vector Machines
Day 10	Random Forest Classifier

Module 4: Neural Networks Perceptron: 3rd Year, (Faculty : Prof. Dr. Tanmay Sinha Roy)

WORKING DAY	LESSON PLAN – DESCRIPTION
Day 1	Neural Networks Perceptron- Introduction.
Day 2	Multilayered Perceptron
Day 3	Classifier Evaluation
Day 4	Ensemble Learning
Day 5	Boosting
Day 6	supervised Learning
Day 7	Unsupervised Learning
Day 8	Clustering
Day 9	Dimensionality Reduction
Day 10	Reinforcement Learning

Module 5: Introduction to Deep Learning: 3rd Year, (Faculty : Prof. Dr. Tanmay Sinha Roy)

WORKING DAY	LESSON PLAN – DESCRIPTION
Day 1	Deep Learning- Fundamentals
Day 2	Kernels in CNN Model, Hyper-Parameters
Day 3	CNN Model Architecture, AlexNet, LeNet, VGG Networks
Day 4	Google Network, Residual Networks.

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	0	1	1	0	0	0	1
CO2	3	3	2	2	2	1	1	1	0	0	0	1
CO3	3	3	2	2	2	0	1	1	0	0	0	1
CO4	3	2	2	2	2	1	0	1	0	0	0	1

TEXT BOOK:

1. Artificial Intelligence - by Rich and Knight (McGraw Hill)
2. Artificial Intelligence – by Saroj Kaushik (Cengage)
3. Artificial Intelligence and Soft Computing – by Amit Konar (CRC Press)
4. Machine Learning - Tom Mitchell (TM) (publ. by McGraw Hill)
5. Pattern Classification - Duda, Hart and Stork (DHS) (Wiley, 2nd edn.)

REFERENCE BOOKS:

6. Artificial Intelligence and Machine Learning - by Vinod Chandra S.S. (PHI Learning, 1st edn., 2014)
7. Artificial Intelligence by Padhy, (Oxford University Press, 2005)
8. A First Course in Artificial Intelligence – by Deepak Khemani (McGraw Hill, 2013)
9. Artificial Intelligence by Nils J. Nilsson (Elsevier India; First Ed, 2003)
10. Introduction to Machine Learning - **E. Alpaydin (EA)** (publ. MIT Press, 3rd edn.)
11. The Elements of Statistical Learning - **Hastie, Tibshirani, Friedman (HTF)** - (publ. Springer, 2nd edn.)
12. Understanding Machine Learning: From Theory to Algorithms - **Shai Shalev- Shwartz and Shai Ben-David**, (publ. Cambridge University Press)
13. Pattern Recognition and Machine Learning - **Christopher Bishop** (publ. Springer)

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus and Lesson Plan for B.Tech Admission Batch 2022

Name of the Course/ Subject:	**Analog and Digital Communication Lab**	**Subject Code:**	**PCC-EEE 791**
Semester	**VII**	**Course Nature**	**Theory**
Pre-Requisite(s):	Analog and digital communication theory		
Lecture Periods/Week	Tutorial Periods/Week	Practical Periods/Week	Credits
0	**0**	**3**	**1**

Course Objective(s):

The purpose of learning this course is to-

1 Understand various modulation and demodulation techniques in time domain and frequency domain.

2 Comprehend pulse analog modulation and demodulation techniques

3 Impart hands on experience and train the students to analyze various base band and pass band modulation and demodulation techniques and understand their performance

4 Comprehend various coding techniques on transmission medium in digital communications

Detailed Syllabus

1. Measurement of modulation index of an AM signal.
2. Measurement of output power with varying modulation index an AM signal (for both DSB- & SSB).
3. Measurement of distortion of the demodulated output with varying modulation index of an AM signal (for both DSB-SC & SSB).
4. Measurement of power of different frequency components of a frequency modulated signal & the measurement of the bandwidth.
5. Design a PLL using VCO & to measure the lock frequency.
6. Design a FM demodulator using PLL.
7. Measurement of SNR of a RF amplifier.
8. Measurement of selectivity, sensitivity, fidelity of a super heterodyne receiver.
9. Study of waveforms of various functional points (output of RF,IF & video) of a B/W TV receiver.
10. Study of the vertical & horizontal sweep of the time base unit of a B/W TV.
11. Design, implementation and study of all the properties of 7-length and 15-length pn sequences using shift register.
12. Study of PAM and demodulation.
13. Study of PCM and demodulation.
14. Study of line coders: polar/unipolar/bipolar NRZ, RZ and Manchester.
15. Study of delta modulator and demodulator.
16. Study of adaptive delta modulator and demodulator.
17. Study of BPSK modulator and demodulator.
18. Study of BFSK modulator and demodulator.
19. Study of ASK modulator and demodulator.
20. Study of QPSK modulator and demodulator.
21. Simulation study of probability of symbol error for BPSK modulation.
22. Simulation study of probability of symbol error for BFSK modulation.

Course outcomes:

At the end of the course, the students will be able to

LO1. Understand various modulation and demodulation techniques in time domain and frequency domain.
LO2. Comprehend pulse analog modulation and demodulation techniques
LO3. Analyze various base band pass band modulation and demodulation techniques and understand their performance
LO4. Comprehend various coding techniques on transmission medium in digital communications.

QUESTION PAPER PATTERN AND DATES

EXAMINATION	Dates	PART – A	PART – B	PART – C	TOTAL MARKS
Mid Term 1		Attempt 5 out of 10 questions; Each question carries 2 marks (2 × 5)	Attempt 2 out of 4 questions; Each question carries 5 marks (5 × 2)	Attempt 1 out of 2 questions; Each question carries 10 marks (10 × 1)	**30**
Mid Term 2		Attempt 5 out of 10 questions; Each question carries 2 marks (2 × 5)	Attempt 2 out of 4 questions; Each question carries 5 marks (5 × 2)	Attempt 1 out of 2 questions; Each question carries 10 marks (10 × 1)	**30**
End Semester Examination		Attempt 10 out of 15 questions; Each question carries 2 marks (2 × 10)	Attempt 6 out of 9 questions; Each question carries 5 marks (5 × 6)	Attempt 5 out of 8 questions; Each question carries 10 marks (10 × 5)	**100**

Examination Rules & Regulations:

https://iemcollege-my.sharepoint.com/:b:/g/personal/iemcoe_office_iem_edu_in/EXrcoe3d6oxIogHKO074XeUBC9qm3XNaf_qUeSiVTNh5OQ?e=MMQn40