Shri Shankaracharya Technical Campus, Bhilai

(An Autonomous Institute Affiliated to CSVTU Bhilai)

Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Sl. No.	Board of Studies (BOS)	Courses	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit
							Theory/Lab				
				L	T	P	ESE	CT	TA		
1	Electronics & Telecommunication	RF & Microwave Communication Engineering	**ET105701**	2	1	-	100	20	30	150	3
2	Electronics & Telecommunication	Advance Communication Systems	**ET105702**	2	1	-	100	20	30	150	3
3	Electronics & Telecommunication	Cryptography & Network security	**ET105703**	3	-	-	100	20	30	150	3
4	Electronics & Telecommunication	Professional Elective-III (Refer Table III)	Refer Table- III	3	-	-	100	20	30	150	3
5	Electronics & Telecommunication	Open Elective-II (Refer Table IV)	Refer Table-IV	3	-	-	100	20	30	150	3
6	Electronics & Telecommunication	Microwave Communication & Engineering LAB	**ET105791**	-	-	2	25	-	25	50	1
7	Electronics & Telecommunication	Fiber Optical Communication Lab	**ET105792**	-	-	2	25	-	25	50	1
8	Electronics & Telecommunication	Capstone Project Phase I	**ET105793**	-	-	4	50	-	50	100	2
9	Electronics & Telecommunication	Internship assessment/Industrial training(Report and Seminar)	**ET105794**	-	-	2	-	-	25	25	1
10	Electronics & Telecommunication	Universal Human Values and Professional Ethics	**ET100795**	-	-	-	-	-	25	25	-
Total				**13**	**2**	**10**	**600**	**100**	**300**	**1000**	**20**

Note:

(a) Abbreviations used : L-Lecture, T- Tutorial, P- Practical, ESE- End Semester Exam, CT- Class Test, TA- Teacher's Assessment

(b) The duration of end semester examination of all theory papers will be of three hours.

		July 2023	1.00	Applicable for AY 2023-24 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Table-III (Professional Elective-III)

Sl. No.	Board of Studies (BOS)	Courses (Subject)	Course Code	Credit
1	Electronics & Telecommunication	**Computer Networks**	**ET105721**	3
2	Electronics & Telecommunication	Industrial Automation	**ET105722**	3
3	Electronics & Telecommunication	Speech and Audio Processing	**ET105723**	3
4	Electronics & Telecommunication	Adaptive Signal Processing	**ET105724**	3
5	Electronics & Telecommunication	Digital System Design using Verilog	**ET105725**	3

Table-IV (Open Elective-II)

Sl. No.	Board of Studies (BOS)	Courses (Subject)	Course Code	Credit
1	Electronics & Telecommunication	**Management Concept & Techniques**	**ET100741**	3
2	Electronics & Telecommunication	AI and Machine learning	**ET100742**	3

SYLLABUS

B.TECH. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)

SEVENTH SEMESTER

Shri Shankaracharya Technical Campus, Bhilai

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Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code :- ET105701	RF & Microwave Communication Engineering	L =2	T = 1	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To inculcate understanding of the basics required for circuit representation of RF networks. 2. To deal with the issues in the design of microwave amplifier. 3. To instill knowledge on the properties of various microwave components. 4. To deal with the microwave generation and microwave measurement techniques.	**CO1:** Explain the active & passive microwave devices & components used in Microwave communication systems. **CO2:** Analyze the multi- port RF networks and RF transistor amplifiers. **CO3:** Generate Microwave signals and design microwave amplifiers. **CO4:** Discuss various Passive and active Microwave Devices. **CO5:** Measure and analyze Microwave signal and parameters.

UNIT-I:Introduction: **[CO1]**

RF & Microwave spectrum, Historical Background, Typical application of RF & Microwaves, Two port Network Theory: Review of Low frequency parameters: Impedance, Admittance, Hybrid and ABCD parameters, Different types of interconnection of Two port networks, High Frequency parameters, Formulation of S parameters, Properties of S parameters, Reciprocal and lossless Network, Transmission matrix, RF behavior of Resistors, Capacitors and Inductors.**[8Hrs]**

UNIT-II: RF Amplifiers and matching networks: **[CO2]**

Characteristics of Amplifiers, Amplifier power relations, Stability considerations, Stabilization Methods, Noise Figure, Constant VSWR, Broadband, High power and Multistage Amplifiers, Impedance matching using discrete components, Two component matching Networks, Frequency response and quality factor, T and Pi Matching Networks, Microstrip Line Matching Networks . **[8Hrs]**

UNIT-III : Microwave Generation: **[CO3]**

Limitation of conventional tubes in microwaves, working principles and characteristics of Two cavity and multicavity Klystron, Reflex Klystron, Traveling wave tube, Magnetron, Backward wave Crossed field amplifier and oscillator **[8Hrs]**

UNIT-IV: Passive and active Microwave Devices: **[CO4]**

Tunnel diode, Gunn diode, IMPATT diode, TRAPATT diode, Microwave bipolar transistor, hetero-junction bipolar transistor, parametric amplifier, Varactor diodes Passive Components: S- matrix, Directional couplers, Bethe-hole coupler, T-junctions, Magic tee, Hybrid ring, Circulator, Isolator, matched Terminators, Attenuators, Phase shifters, Power dividers. **[8Hrs]**

		July 2023	1.00	Applicable for AY 2023-24 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

UNIT-V: Microwave Measurements: **[CO5]**
Measurement of VSWR-Low, Medium and High, Measurement of power, Bolometer, Measurement of Impedance, Frequency, Q-factor, Attenuation, S-parameters.
Measuring Instruments :
Principle of operation and application of VSWR meter, Power meter, Spectrum analyzer, Network analyzer.
Application of Microwaves:
Introduction to satellite communication, Radar, Industrial application of microwaves. **[8Hrs]**

Text Books:

S.No.	Title	Authors	Publisher
1	Microwave Devices & Circuits	S.Y.Liao Pearson Education	PHI
2	Microwave Engineering ,	Monojit Mitra ,Dhanpath Rai	New Delhi
3	Microwaves	K.C.Gupta	New Age Publishers
4	RF Circuit Design: Theory and Applications	Reinhold Ludwig and Gene Bogdanov,	Pearson Education Inc
5	Foundations for Microwave Engineering	Robert E Colin,	John Wiley & Sons Inc

Reference Books:

S. No.	Title	Authors	Publisher
1	Microwave Electronics	R. F. Soohoo	Wesley publication
2	Microwave Engineering (3/e)	D.M.Pozar	Wiley India
3	Planar Microwave Engineering: A Practical Guide to Theory, Measurements and Circuits",	Thomas H Lee	Cambridge University Press
4	RF and Microwave Electronics	Mathew M Radmanesh	Prentice Hall
5	"Microwave Engineering",	Annapurna Das and Sisir K Das,	TMH

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Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code :- ET105702	Advance Communication Systems	L = 2	T = 1	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To become familiar with fundamentals of satellite communication 2. To learn about the satellite link design 3. To gain knowledge about the different access techniques used in satellite communication. 4. To understand the concepts of Optical communication. 5. To learn about optical transmitters and receivers.	On successful completion of the course, the student will be able to: **CO1**:Understand the basic concepts of Satellite. **CO2**:Calculate the complete C/N ratio of satellite link design, **CO3**:Understand multiple access techniques related to satellite. **CO4**:Understand the concepts of optical fiber communication, **CO5**:Gains knowledge how optical signal is transmitted and received.

UNIT-I Introduction to Satellite: **[CO1]**

Satellite Communication systems, introduction, Kepler's laws, orbits, orbital effects, orbital perturbations, Earth, Look Angles, Earth Coverage and Slant Range, Satellite sub systems, Antennas, Transponders, earth station technology, Satellite systems- GEO systems, non-GEO communication systems**.[8 Hrs]**

UNIT-II: Communication Satellite Link Design: **[CO2]**

Link Design Equation, System Noise Temperature, C/N, G/T Ratio, Atmosphere and Ionosphere Effects on Link Design, Uplink Deign, Complete Link Design, Interference effects on complete Link Design, Earth Station Parameters, Satellite Communication Links: Analog Baseband Signal, FDM Techniques, SNR and CNR in FM in Satellite link**.[8 Hrs]**

UNIT-III Multiple Access Techniques: **[CO3]**

TDMA-Frame and Burst Structure, Frame Efficiency, Super frame, TDMA Frame Acquisition and Synchronization, TDMA burst TME Plan, Multiple Beam TDMA. Introduction: Principle of OFDM, implementation of transceivers, frequency selective Channels, Peak to average power ratio, inter-carrier interference, adaptive modulation capacity, multiple access. **[8Hrs]**

UNIT-IV: Optical Fiber Fundamentals: **[CO4]**

Numerical Aperture, Optical Fiber Modes and Propagation, Single Mode and Multi-Mode Fibers, Step Index and Graded Index Fibers Structures, Different types of Attenuations in Optical Fiber Communication. **[10Hrs]**

		July 2023	1.00	Applicable for AY 2023-24 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

UNIT-V Light Sources, Detectors & Optical Networks: **[CO5]**
Light Emitting Diodes, LASER Principles, Laser Diode, Operating Characteristics and Modulation Circuits of LED and LASER Diodes Principle of Photo-Detection, Semiconductor Photodiode, PIN Photodiode, Avalanche Photodiode**. [8 Hrs]**

Text Books:

S.No.	Title	Authors	Publisher
1	Fundamentals of Satellite Communication	Raja Rao,	Pearson.
2	Satellite Communication	Monojit, Mitra,	PHI
3	Optical Fiber Communication	Keiser,	TMH.
4	Fiber Optic Communications	Palais,	Pearson Education.
5	Theory and Applications of OFDM and CDMA: Wideband Wireless Communications	Henrik Schulze & Christian Lueders	TMH

Reference Books:

S. No.	Title	Authors	Publisher
1	Satellite Communications	Dr. D.C. Agarwal	Khanna Publisher
2	Satellite Communication System Engineering.	Pritchard	Pearson Publication
3	Satellite Communication, Timothy Pratt, John Wiley & sons	Timothy Pratt, John	Wiley & sons
4	Opto Electronics and Fiber Optic Communication	Sarkar & Sarkar	New Age International Publishers
5	Fundamentals of Optical Fiber Communication	Satish Kumar,	PHI
6	Optical Fiber Communication-Principles and Practice	John Senior,	PHI
7	Multi-Carrier Digital Communications: Theory and Applications of OFDM	Burton_R Saltzberg & Mustafa Ergen	TMH

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Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code :- ET105703	Cryptography & Network security	L = 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. Explain the objectives of information security 2.Explain the importance and application of each of confidentiality, integrity, authentication and availability 3. Understand various cryptographic algorithms. 4. Understand the basic categories of threats to computers and networks 5. Describe public-key cryptosystem. 6. Describe the enhancements made to IPv4 by IPSec 7. Understand Intrusions and intrusion detection 8. Discuss the fundamental ideas of public-key cryptography. 9. Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message. 10. Discuss Web security and Firewalls.	At the end of the course student will get the ability to **CO1:** Understand basic Attacks on Computers and Computer Security. **CO2:** Understand basic Symmetric and Asymmetric key Ciphers used in cryptography **CO3:** Ability to understand the Message Authentication Algorithms and Hash Functions **CO4:** Ability to understand E-mail & IP Security **CO5:** Ability to understand the web authentication and security issues.

UNIT-I: Attacks on Computers and Computer Security: [CO1]

Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security. Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks. **[8 Hrs]**

UNIT-II: Symmetric and Asymmetric key Ciphers : [CO2]

Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES, Blowfish), Differential and Linear Crypt analysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution

Asymmetric key Ciphers: Principles of public key cryptography systems, Algorithms(RSA, Diffie-Hellman, ECC), Key Distribution **[8 Hrs]**

UNIT-III : Message Authentication Algorithms and Hash Functions: [CO3]

Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm Authentication

Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication . **[8Hrs]**

UNIT-IV: E-Mail Security: **[CO4]**
Pretty Good Privacy, S/MIME
IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management. **[8Hrs]**

UNIT-V : Web Security: **[CO5]**
Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction.
Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls.**[10Hrs]**

Text Books:

S. No.	Title	Authors	Publisher
1	Cryptography and Network Security	William Stallings,	Pearson Education
2	Cryptography and Network Security	Atul Kahate	Mc Graw Hill

Reference Books:

S. No.	Title	Authors	Publisher
1	Cryptography and Network Security	C K Shyamala, N Harin i, Dr T R Padmanabhan,	Wiley India
2	Cryptography and Network Security	Forouzan Mukhopadhyay,	MC Graw Hill
3	Information Security, Principles and Practice.	Mark Stamp	Wiley India,
4	Principles of Computer Security:	W M.Arthur Conklin, Greg White,	TMH
5	Introduction to Network Security	Neal Krawetz	CENGAGE Learning
6	Network Security and Cryptography	Bernard Menezes	CENGAGE Learning

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Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code: ET105791	Microwave Communication & Engineering LAB	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	ESE	CT	TA	Total	Lab Period
	25	00	25	50	24Hrs

Course Objective	Course Outcomes
1. To inculcate understanding of the basics required for circuit representation of RF networks. **2.** To deal with the issues in the design of microwave amplifier. **3.** To instill knowledge on the properties of various microwave components. **4.** To deal with the microwave generation and microwave measurement techniques..	**CO1.** Students will understand different characteristics of klystron amplifier **CO2.** Student will be able to determine the standing wave ratio and reflection coefficient. **CO3.** Students will understand the characteristics and behavior of Attenuator(fixed and variable type). **CO4.** Students are able to measure the VSWR at all the three open ports of a Directional Coupler. **CO5**. Students will understand to how to energize a Reflex Oscillator.

List of Experiments: (At least Ten experiments are to be performed by each student)

1. V-I characteristics of Gunn diode and to measure output power and frequency vs voltage.
2. Study of different characteristics of klystron amplifier
3. Study of different characteristics of reflex klystron amplifier and hence to determine mode number, transit time, Electronic Tuning Sensitivity(ETS) and Electronic Tuning Range (ETR).
4. Measurement of Q of a cavity.
5. To determine the standing wave ratio and reflection coefficient.
6. To study the characteristic and behavior of a Magic Tee.
7. Determination of S matrix of Magic Tee, E plane Tee & H plane Tee
8. To study the characteristics and behavior of Isolator and Circulators
9. To study the characteristics and behavior of Attenuator(fixed and variable type).
10. To measure the VSWR at all the three open ports of a Directional Coupler.
11. To measure the Coupling Factor, directivity and insertion loss of a Directional Coupler.
12. To measure Microwave Frequency using Frequency Meter.

13. To study various Frequency measurements techniques.
14. To measure VSWR using various methods
15. To measure Attenuation
16. Impedance measurement techniques
17. To study and measure square wave modulation through PIN voltage.
18. To energize a GUNN Oscillator.
19. To energize a Reflex Oscillator.
20. To calibrate Phase Shifter.
21. To measure Dielectric Constant.

Laboratory Project : Application of GUNN Diode

***Note: Laboratory Project is compulsory to all students.**

List of Equipments/Machine Required: Microwave source, Isolator, Variable attenuator, Fixed Attenuator, Frequency meter, Slotted line, Tunable probe, Circulators, Matched terminations, Gunn/Klystron power supply, Detector mount, Cooling fan, Magic Tee, Phase shifter, Movable short, Dielectric Material.

Reference Books:

S. No.	Title	Authors	Publisher
1	Microwave, Radar & RF Engineering: With Laboratory Manual	Prakash Kumar Chaturvedi	Springer

Subject Code: ET105792	Fiber Optical Communication Lab	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	ESE	CT	TA	Total	Lab Period
	25	00	25	50	24Hrs

Course Objective	Course Outcomes
1. To understand the concepts of Optical communication. 2. To learn about optical transmitters and receivers 3. To Learn about the transmission of text, voice, & digital signal over the optical fiber cable. 4. To learn about the AC characteristics of intensity modulation of laser and fiber optic system. 5. To measure plastic fiber patch cord loss for various lengths of fiber	**CO1.** Students will understand about the concepts of optical fiber communication **CO2.** Gains knowledge how optical signal is transmitted and received. **CO3.** Students will be able to transmit the voice through fiber optic cable using PWM**.** **CO4.** Students will be able to transmit and receive text files over fiber optic cable. **CO5.** Students will be able to measure rise time, fall time, pulse width distortion of a laser.

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To measure bending loss of a fiber.
2. To measure propagation or attenuation loss in a fiber.
3. To obtain amplitude modulation and to transmit the same over fiber optic cable and to demodulate the same at the receiver end.
4. To determine the numerical aperture of a fiber.
5. To measure various types of losses occur in an optical fiber.
6. To study the AC characteristics of intensity modulation of laser and fiber optic system.
7. To measure optical power of a laser diode vs forward current.
8. To monitor photo diode current vs laser optical output.
9. Demonstration of voice transmission through optical fiber using FM. 11. Communication between two computers using RS232 interface via optical fiber.
10. To measure plastic fiber patch cord loss for various lengths of fiber.
11. To study voice transmission through fiber optic cable using PWM.
12. To transmit and receive text files over fiber optic cable.
13. To transmit, receive and observe digital signals over fiber optic cable.
14. To measure rise time, fall time, pulse width distortion of a laser and to determine transmission delay.

Laboratory Project: Transmit & receive voice through fiber cable

***Note: Laboratory Project is compulsory to all students.**

List of Equipments/Machine Required: Fiber optic trainer kit, Optical fiber, Splicing unit, Data Acquisition card for optical signal, O/E & E/O Converter. CRO.

Reference Books:

S. No.	Title	Authors	Publisher
1	Fundamentals of Optical Fiber Communication	Sathish Kumar	PHI

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Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code: ET105793	Capstone Project Phase I	L = 0	T = 0	P = 4	Credits = 2
Evaluation Scheme	ESE	CT	TA	Total	Lab Period
	50	00	50	100	24Hrs

Course Objective	Course Outcomes
The objective of this course is to improve student's ability to analyze, design and solve complex engineering problems through pedagogies (**Project Based Learning**) that support them in developing these skills. The goal here is not to passively absorb and reiterate information; but rather to actively engage with the content, work through it with others, relate to it through an analysis, use modern tools and effectively solve problems with the corresponding knowledge gained.	**On successful completion of the course, the student will be able to**: **CO1:** Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. **CO2:** Reproduce, improve and refine technical aspects of engineering projects applying appropriate techniques, resources, and modern engineering and IT tools. **CO3:** Work as an individual and as a member or leader in teams in development of technical projects. **CO4:** Follow management principle and value health, safety and ethical practices during project. **CO5:** Communicate and report effectively project related activities and findings.

The Process Followed to Maintain the Quality of Student Projects are:

a) Allotments of Projects
b) Project Identification
c) Continuous Monitoring
d) Evaluation

a). Allotment of Projects:

i. Individual Student has to submit their areas in which they would like to pursue their projects.
ii. Through meeting and deliberations students are allotted guide depending on their preference and maximum number of students under a faculty is limited to three.

b). Identification of projects: Students are asked to formulate problem statement and state objectives of their project in consultation with the project guide.

c). Continuous Monitoring:

i. Progress is continuously monitored by guide and instructions are given how to proceed further during their project periods as per time table.
ii. Students submit weekly progress report to the project in-charge after consultation with their project guide.

d). Evaluation

i. In order to evaluate projects two project seminars (assessment) are taken in which student present their project through presentations and demonstrate their work.
ii. Students are assessed on the basis of their technical skill implementation, use of

	modern tools, communication skill, team work, health, safety and ethical practices and relevance of the project.
iii.	At the end of the semesters a report is submitted by the students and student's projects are finally evaluated by external examiner in end semester practical examination based on demonstration by students.

Subject Code: ET105794	Internship assessment/Industrial training (Report and Seminar)	L = 0	T = 0	P =2	Credits = 1
Evaluation Scheme	ESE	CT	TA	Total	Lab Period
	-	-	25	25	-

Course Objectives	Course Outcomes
The purpose of internship is to expose students to real work environment and at the same time gain the knowledge through hands on observation and job execution. From the internship, the students will also develop skills in work ethics, communication, management and others. This practical training program allows students to integrate classroom theory with workplace practice and develop greater clarity about academic, career goals and need to update knowledge. Students are provided with the opportunity to test their interest in a particular career before permanent commitments are made.	**On successful completion of the course, the student will be able to:** **CO1:** Discuss the organizational structure, tools/software/technology, production activities/service, of the industry/company. **CO2:** Identify, formulate and model industrial problems and find solution applying fundamental principles of engineering. **CO3**: Demonstrate an awareness of social, cultural, global, environmental responsibility and skills in communication, management, leadership and entrepreneurship. **CO4:** Update with all the latest changes in technological world, develop capability and enthusiasm for self - improvement through continuous professional development and life-long learning. **CO5:** Present seminar and submit internship report to communicate and report effectively the internship related

FORMAT FOR INTERNSHIP REPORT

1. Cover Page (color print)
2. Inner Pages
   a) Certificate by Company/Industry
   b) Declaration by student
   c) Acknowledgement
3. Abstract
4. Table of Contents
5. List of Tables
6. List of Figures
7. Abbreviations and Nomenclature (if any)
8. Chapters
   I. Introduction (An overview of the whole report)
   II. Formal Training provided (if applicable) [This section describes the training provided through formal classroom training environment. Brief description ofeach training session and its benefit towards the training program]
   III. Industrial Training [The section should describe the following:
      - Objectives
      - Tools & Technology Used
      - Techniques Studied in Different Departments
      - Software &Tools Used
      - Highlights of Training Exposure (Area, Sope)]
   IV. Problem Identification/Case study (Discussions)
   V. Recommendations
9. References
10. Appendices
    i. Data Sheets (if any)
    ii. Snapshots (if any)

SYLLABUS (Professional Elective-III)

B.TECH. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)

SEVENTH SEMESTER

Table-III (Professional Elective-III)

Sl. No.	Board of Studies (BOS)	Courses (Subject)	Course Code	Credit
1	Electronics & Telecommunication	**Computer Networks**	**ET105721**	3
2	Electronics & Telecommunication	Industrial Automation	**ET105722**	3
3	Electronics & Telecommunication	Speech and Audio Processing	**ET105723**	3
4	Electronics & Telecommunication	Adaptive Signal Processing	**ET105724**	3
5	Electronics & Telecommunication	Digital System Design using Verilog	**ET105725**	3

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Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code :- ET105721	Computer Networks	L =3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. **1.** To make students understand the basic model of data communication, OSI Model, TCP/IP suite and various concepts of networking. 2. To make students acquainted with Data Link Layer and various flow control and error control protocol. 3. To familiarize students with different LAN protocols like Ethernet, Token ring and Token Bus and FDDI. 4. To teach students about connecting devices, Network and transport layer protocols. 5. To give knowledge of the Application layer functions, protocols, switching and switched networks like ATM.	**CO1.** Students will be able to understand the working of internet based on OSI model and TCP/IP protocol suite. **CO2.** Students will be able to analyze practical requirements of LAN on the basis of various topologies , signaling techniques and various interfaces. **CO3**. Students will be able to analyze various Ethernet standards, other standards and will be able to choose an appropriate standard according to requirement of LAN. **CO4**. Students will be able to identify various internetworking devices and formation of Headers of IP and TCP. **CO5.** Students will get idea about various Application layer functions and some protocols along with switching techniques and ATM.

UNIT-I: Introduction to Data Communication, Data networking and Internet: **[CO1]**

Communication System Model, Data Communication Networks, Protocol, Need of Protocol, TCP/IP Protocol Suite, OSI Model, Transmission Modes, Categories of Network, Topologies of Network. Signal Encoding Techniques: Digital to Digital Conversion- Unipolar, Polar: NRZ, RZ, Biphase, Bipolar, Transmission of Digital Data: DTE DCE Interface, EIA-232D,Null Modem, Modems: Traditional Modem, 56KModem **[7Hrs]**

UNIT-II: Data Link Control Protocol: **[CO2]**

Data Link Layer: Design Issues, Framing, Error Detection and Correction: CRC, Elementary Protocols-Flow Control: Stop and Wait, Sliding Window, Error Control: Stop-and-Wait, Go Back-N, Selective Repeat. HDLC: Modes, Frames, Data Transparency, Bit Stuffing. **[8Hrs]**

UNIT-III Local Area Network: **[CO3]**

Project 802,Basic of–IEEE 802.1, LLC, MAC, PDU; ETHERNET: Access Method: CSMA/CD, Implementation: Thick Ethernet, Thin Ethernet, Twisted Pair Ethernet, Switched Ethernet, Fast Ethernet, Gigabyte Ethernet, Token Ring, FDDI, Introduction to Wireless LAN-IEEE802.11 : Architecture, MAC: CSMA/CA. **[7Hrs]**

UNIT-IV : Internet and Transport Protocol: **[CO4]**

Principle of Internet working, Connecting devices: Repeaters, Hubs, Bridges, Routers. Internet Protocol: IP Addressing, IPV4Header,Comparison ofIPV4andIPV6, Sub netting, ARP,RARP, ICMP, IGMP. Transport Layer Protocols: UDP, TCP: TCP Header format, ISDN services. **[7Hrs]**

UNIT-V Application layer and Wide Area Network: [CO5]
Application Layer: The Web and HTTP, FTP, SMTP, DNS, WAN: Circuit and Packet switching, Asynchronous Transfer Mode-ATM architecture: Virtual Connection, Identifiers, Cells, Connection Establishment and Release. Switching: VPC switch; ATM Layers: AAL **[7Hrs].**

Text Books:

S. No.	Title	Authors	Publisher
1	Data Communication and Computer Networking	B. A. Forouzan	Tata McGraw Hill
2	Data and Computer Communications	William Stalling	Pearson Education.

Reference Books:

S. No.	Title	Authors	Publisher
1	Computer Networks	Andrew S Tanenbaum,	Pearson Education
2	An Engineering Approach to Computer Networks-	S.Keshav	Pearson Education
3	Understanding communications and Networks,	W.A Shay	Thomson

Subject Code :- ET105722	Industrial Automation	L = 3	T =0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To develop and apply Mathematical and Engineering skills to identify, formulate and solve industrial process problems. 2. This subject seeks to close the gap between Instrumentation and Mechanical Engineering. 3. This subject provides the knowledge of different types of controller & their applications. 4. This subject provides the basic knowledge of PLC and DCS	**The students will be able to**: **CO1**. Understand process variables, degrees of freedom, and Self regulation, first & second order Process System. **CO2**. Know the importance of on-off, proportional, integral and derivative modes, composite control modes-PI, PD and PID controllers. **CO3.**Know the importance of Analog Controller, Modes, and their implementation. **CO4.** Understand about the PLC(Programmable Logic Controller). **CO5.** Understand, Communication in DCS, DCS system integration with PLC and computers, Data loggers, Data Acquisition systems (DAS),computer control hierarchy levels and Direct Digital control (DDC).

UNIT-I:Introduction to Process Control: : **[CO1]**

Process Control Block Diagram, Control System Evaluation, Digital Control, Supervisory Control, Direct Digital Control, Networked Control Systems, Distributed Digital Control, Smart Sensor, Definitions of the terms used to describe Process Control. Data Acquisition Systems: DAS Hardware, DAS Software, Data Logger. **[10Hrs]**

UNIT-II Controller Principles : **[CO2]**

Process Characteristics, Process Equation, Process Load, Process Lag, Self Regulation, Control System Parameters: Error, Variable Range, Control Parameter Range, Control Lag, Dead Time, Cycling, Controller Modes: Discontinuous Controller Mode, Two Position Mode, Multi Position Mode, Floating Control Mode, Continuous Control Mode, Proportional Control Mode, Integral Control Mode, Derivative Control Mode, Composite Control Modes: PI Control, PD Control, PID Control.**[8Hrs]**

UNIT-III Analog Controllers: : **[CO3]**

Analog Controllers: Introduction, Electronic Controllers: Error Detector, Single Controller Modes, Composite Controller Modes, Pneumatic Controllers: General features, Mode Implementation.. **[8Hrs]**

UNIT-IV Programmable Logic Controller: **[CO4]**

PLC Architecture, Basic Structure, PLC Programming: Ladder Diagram, Ladder Diagram symbols, Ladder Diagram circuits, PLC Communications and Networking, PLC Selection, I/O Quantity and Type, I/O

Remoting requirements, Memory size and type, Programmer Units, PLC Installation, Advantages of using PLCs. **[8Hrs]**

UNIT-V Distributed Control System: **[CO5]**

Introduction, Overview of Distributed Control Systems, DCS Software configuration, DCS Communication, DCS Supervisory Computer Tasks, DCS Integration with PLCs and Computers, Features of DCS, Advantages of DCS.**[8Hrs]**

Text Books:

S.No.	Title	Authors	Publisher
1.	Process Control Instrumentation Technology	C.D. Johnson	PHI
2.	Computer Aided Process Control	S. K. Singh	PHI

Reference Books:

S. No.	Title	Authors	Publisher
1.	Introduction to Instrumentation & Control	A.K. Ghosh	Eastern Economy Edition
2.	Intelligent Instrumentation,	George C .Barney,	Prentice Hall India.

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Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code :- ET105723	Speech and Audio Processing	L = 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To provide an introduction to basic concepts and methodologies for the analysis, modeling, synthesis and coding of speech and music. 2. To provide a foundation for developing applications and for further study in the field. 3. To introduce software tools for the analysis and manipulation of speech and music. 4. To gain practical experience in the design and implementation of speech and music processing algorithms	**At the end of the course, the students will be able to** **CO1.** Comprehend the speech production and hearing models. **CO2.**Design and apply models for speech and audio signal processing. **CO3.**Extract feature i.e. Pitch from the speech signal **CO4.** Implement the methods for speech enhancement and speech coding for speech signals **CO5.** Implement the methods to Recognize speaker from the spectral features of speech signal.

UNIT I Introduction: **[CO1]**

Anatomy and physiology of speech production, categorization of speech sounds, Prosody, Parameters of Speech: Pitch and Formants.**[8Hrs]**

UNIT II Analysis and Synthesis of Speech and Audio signals: **[CO2]**

Spectral Analysis Models, Linear Predictive Coding Model for Speech Recognition, The autocorrelation method, The covariance method, Short-Time Fourier Transform Analysis and Synthesis, Short-Time Fourier Transform Magnitude, Filter Bank Summation method, Overlap-Add method.**[8Hrs]**

UNIT III Frequency Domain Pitch Estimation: **[CO3]**

A correlation-based Pitch Estimator, Pitch Estimation based on Comb Filter, Pitch Estimation based on a Harmonic Sine wave Model. .**[8Hrs]**

UNIT IV Speech Coding : **[CO4]**

Vector Quantization, Frequency-Domain Coding, Model-based Coding. Enhancement of Speech and Audio Signals Spectral subtraction, Cepstral Mean Subtraction, Wiener Filtering.**[8Hrs]**

UNIT V Speaker Recognition : **[CO5]**

Spectral Features required for Speaker Recognition, Minimum Distance classifier, Gaussian Mixture Model. **[8Hrs]**

Text Books:

S.No.	Title	Authors	Publisher
1.	Theory and Applications of Digital Speech Processing	L.R. Rabiner, R. W. Schafer	Prentice Hall
2.	Speech and Audio Signal Processing: Processing and Perception of Speech and Music	B. Gold, N. Morgan, D. Ellis	Wiley-Blackwell
3.	Speech and Audio Processing: A MATLAB-based Approach	Ian Vince Mcloughlin	Cambridge University Press

Reference Books:

S. No.	Title	Authors	Publisher
1.	Applied signal processing: a MATLAB-based Proof of Concept	T. Dutoit, F. Marqués, L.R. Rabiner,	Springer
2.	Discrete-Time Speech Signal Processing: Principles and Practice	T.F. Quartieri	Prentice Hall

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Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code :- ET105724	Adaptive Signal Processing	L = 3	T = 1	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. Understand the concepts of gradient and mean square error performance in adaptive systems 2. Explain gradient descent algorithms and gradient estimate 3. Derive LMS algorithms and formulate conditions of convergence 4. Explain applications of adaptive signal processing	**After the course the student will be able to** **CO1.** Understand the concepts of gradient and mean square error performance in adaptive systems **CO2.** Apply gradient descent algorithms, gradient estimate and LMS algorithms in adaptive systems **CO3**. Formulate conditions of convergence **CO4.** Implement applications of adaptive signal processing **CO5.** To design adaptive filters for different applications

UNIT I Introduction: : [CO1]

Adaptive Systems – Definition and characteristics, General properties, Open and Closed Loop Adaptations, Applications. The Adaptive Linear Combiner: Performance function, Gradient and Mean Square Error, Examples. **[8Hrs]**

UNIT II Theory of Adaptation with Stationary Signals : [CO2]

Properties of the Quadratic Performance Surface, Significance of eigen values, eigen vectors, correlation matrix. Searching the Performance Surface: Basic ideas of gradient search A simple gradient search algorithm, Stability and Rate of convergence, the learning curve. Newton's method, Steepest descent method, Comparison.**[8Hrs]**

UNIT III Gradient Estimation and its effects on adaptation: [CO3]

Gradient component estimation by derivative measurement, The performance penalty, Variance of the gradient estimate, Misadjustment. Adaptive Algorithms and Structures: The LMS Algorithm, Derivation, Convergence of the weight vector, learning Curve, Performance analysis, Filtered X LMS algorithm.**[8Hrs]**

UNIT IV Adaptive signal processing: : [CO4]

Adaptive Lattice predictor, Adaptive filters with orthogonal signals. Applications of Adaptive signal processing: Adaptive modeling of a multi-path communication channel, adaptive model in geophysical exploration, Adaptive interference canceling: applications in Bio-signal processing**7Hrs]**

UNIT V Adaptive Control Systems : [CO5]

Adaptive Control Systems using Filtered X LMS Algorithm, Adaptive Noise Cancellation using Adaptive filter , Adaptive Modeling and System Identification using adaptive filter, Inverse Adaptive Modeling, Deconvolution, and equalization using adaptive filter.**[7Hrs]**

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Text Books:

S.No.	Title	Authors	Publisher
1.	Adaptive Signal Processing,	Bernard Widrow and Samuel D.	Stearns, Pearson Education
2.	Adaptive Filter Theory	Simon Haykin	Prentice Hall
3.	Adaptive Signal Processing	B. Widrow and S. D. Sterns	Pearson Education

Reference Books:

S. No.	Title	Authors	Publisher
1.	Theory and Design of Adaptive Filters	M. J. Larrimore, C. R. Johnson and J. R. Treichler	University Press
2.	Statistical and Adaptive signal processing	Ingle and Kogon Manalokis,	- Artech House INC., 2005
3.	Adaptive filters	Sayed A H	John Wiley
4.	Adaptive filtering primer with MATLAB	Poularikas A, Z M Ramadan	Taylor and Francis Publications

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Scheme of Teaching & Examination (Effective from 2020-2021 Batch)

B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code :- ET105725	Digital System Design using Verilog	L =3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To understand basics of Verilog HDL Language, including its use in synthesis of digital designs. 2. To gain knowledge of modeling, simulation and verification of designs with Verilog HDL. 3. To understand combinational circuit design of digital systems with Verilog HDL. 4. To understand sequential circuit design of digital systems with Verilog HDL. 5. To understand designing using Mealy State and Moore State Model	Students will be able to: **CO1.**Use VLSI design methodologies to understand and design complex digital systems. **CO2** Students are expected to understand **Verilog-HDL** programming concepts. **CO3.** Students are able to write **Verilog-HDL** code of any combination circuits. **CO4.** Students are able to write **Verilog-HDL** code of any Sequential circuits. **CO5**. Students are expected to understand about FSM and their programming in **Verilog-HDL**

UNIT-I Overview of Digital Design with Verilog-HDL: **[CO1]**

Emergence of HDLs, Typical Design Flow, Importance of HDLs, Popularity of Verilog HDLs. Design Methodologies, Modules, Instances, Lexical conventions, Data Types, System Tasks and Compiler directives. **[10Hrs]**

UNIT-II Modeling in Verilog-HDL: **[CO2]**

Modules and Ports, Gate-Level Modeling: Gate Types, GateDelays ; Dataflow Modeling: Assignment Statement, Delays, Expressions, Operator Types, Operands; Behavioral Modeling: Structured Procedures, Procedural Assignment, Timing Controls, Conditional Assignment Statements, Loops, Sequential and Parallel, Blocks, Generate Blocks. **[10Hrs]**

UNIT-III Combinational Circuit Design: **[CO3]**

Multiplexers, Demultiplexers, Encoder, Decoders, Code Converters, Arithmetic Comparisons Circuits, Tasks and Functions. **[8Hrs]**

UNIT-IV Sequential Circuit Design: **[CO4]**

Flip-Flops: SR, JK, T and D; Registers: Shift Registers, Parallel Access Shift Registers; Counter: Asynchronous Counters, Synchronous Counters, Counters with Parallel load, BCD counter. **[8Hrs]**

UNIT-V FSM: **[CO5]**

Basic Design Steps, State Diagram, State Table, State Assignment, State Assignment Problem, One Hot Encoding, Mealy State Model, Moore State Model, Design Example: Serial Adder, Vending Machine, Bus Architecture. **[10Hrs]**

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Text Books:

S.No.	Title	Authors	Publisher
1.	VERILOG HDL: A Guide to Digital and Synthesis,IEEE1364-2001Compliant	Samir Palnitkar	Pearson Ed
2.	Fundamentals of Digital Logic with Verilog Design	Stephen Brown & Zvonko Vranesic	TMH

Reference Books:

S. No.	Title	Authors	Publisher
1.	Design Through Verilog-HDL	T.R. Padmanbhan and B.Bala Tripura Sundari	IEEE Press
2.	Verilog- HdL Synthesis: A Practical Primer	J.Bhasker	PHI

SYLLABUS

(OPEN ELECTIVE-II SUBJECTS)

B.TECH.
(BOARD OF STUDY-ELECTRONICS & TELECOMMUNICATION ENGINEERING)
SEVENTH SEMESTER

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Table-IV (Open Elective-II)

Sl. No.	Board of Studies (BOS)	Courses (Subject)	Course Code	Credit
1	Electronics & Telecommunication	**Management Concept & Techniques**	**ET100741**	3
2	Electronics & Telecommunication	AI and Machine learning	**ET100742**	3

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Subject Code :- ET100741	Management Concept & Techniques	L =3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To develop skill of project planning and management amongst student. 2. To understand the significance of human recourse and its proper utilization for the growth of organization. 3. Students will learn to minimize the project cost by using effective management technique.	**CO1.** Students will be capable of understanding the correlation between physical, market and human resources. **CO2.** Students will be capable of understanding Marketing management, Financial management and accounting concepts. **CO3.**The student will be able to get the overview of Production/operations management. **CO4.** Student will gain the knowledge about MIS. **CO5.** The student will get the knowledge of Social and ethical issues in management

UNIT-I: Basic management and techniques: **[CO1]**

Definition and nature of management, Function of management, nature, purpose and objectives of planning, organizing and staffing, authority and responsibility, controlling, process of controlling, control techniques.

Human resource management: nature and scope of human resource planning, training and development, recruitment and selection, motivation and its types, need of motivation, reward and punishment, models of motivation, performance appraisal, leaders, types of leaders, leadership styles, roles and functions of leaders.**[8 Hrs]**

UNIT-II: Marketing management: **[CO2]**

Marketing environment, customer markets and buyer behaviour, marketing mix, advertising and sales promotion, channels of distribution.

Financial management and accounting concepts: book keeping, financial statements analysis, financial ratios, capital budgeting, and breakeven analysis.**[7 Hrs]**

UNIT-III : Production/operations management: **[CO3]**

Planning and design of production and operations systems, facilities planning, location, layout and movement of materials, materials management and inventory control, maintenance management, PERT and CPM. **[7 Hrs]**

UNIT-IV: Management information systems: **[CO4]**

Role of information in decision making, information system planning, design and implementation, evaluation and effectiveness of the information system, statistical quality control, total quality management

and ISO certificate. **[7Hrs]**

UNIT-V Social and ethical issues in management: **[CO5]**
Ethics in management, social factors, unfair and restrictive trade practices. Strategic and technology management: need, nature, scope and strategy SWOT analysis, value chain concept.**[7Hrs]**

Text Books:

S.No.	Title	Authors	Publisher
1	Principles of Management	Ankur chhabra	Sun India publications
2	Principles and practice of Management	L.M. Prasad	PHI
3	Human Resource Management	V.S.P Rao	TMH

Reference Books:

S. No.	Title	Authors	Publisher
1	Industrial engineering and production management,	Martand Telsang,	S. Chand
2	Management science	Ramchandra	TMH
3	Management theory and practice	Chandan	Vikas publications

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B. Tech. (Electronics & Telecommunication Engineering) Seventh Semester

Subject Code :- ET100742	AI and Machine learning	L =3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To learn the concepts of searching for AI problems 2. To learn about agents and knowledge representation 3. To understand the various factors involved in inferences 4. To get introduced to fundamentals of machine learning 5. To learn about the possibilities of Supervised and Unsupervised learning	Upon completion of the course, the students will be able to: **CO1.** Suggest appropriate search strategies for any AI problem **CO2.** Design agents for any given problem **CO3.** Represent real world knowledge using first order or propositional logic **CO4.** Solve problems by appropriated using the supervised or unsupervised machine learning algorithms **CO5.** Suggest appropriate clustering algorithm for solving real-world problems

UNIT-I: AI : [CO1]

History of AI - Agents - Structure of Intelligent agents - Environments - Problem solving methods - Problem solving agents - Formulating problems - search strategies - Breadth-first - Uniform cost - Depth-first - Depth limited - Bidirectional - Informed Search - Best-first Heuristic Functions - Memory bounded search - A* - SMA* - Iterative Improvement algorithms - Hill Climbing - Simulated annealing - Measure of performance and analysis of search algorithms.**[8 Hrs]**

UNIT-II: Game playing : [CO2]

Perfect Decisions - Imperfect Decisions - Alpha-beta pruning - Knowledge based agent - Wumpus World Environment - Propositional logic - agent for wumpus world - First order logic - syntax - semantics - extensions - Using First order logic - Representation change in the world - Goal based agents. .[**7 Hrs]**

UNIT-III: Knowledge Base : [CO3]

Knowledge representation - Production based system - Frame based system - Inference - Backward chaining - Forward chaining. **[7 Hrs]**

UNIT-IV: Learning from agents: [CO4]

Inductive learning - Types of Machine learning - Supervised learning - learning decision trees - support vector machines - Neural and Belief networks - Perceptron - Multi-layer feed forward networks - Bayesian belief networks. .**[7Hrs]**

UNIT-V: Unsupervised learning [CO5]

K-means clustering - hierarchical clustering - Agglomerative and Divisive clustering - Fuzzy clustering.**[7 Hrs]**

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Text Books:

S.No.	Title	Authors	Publisher
1	AI – A Modern Approach	Stuart Russel, Peter Norvig	Pearson Education
2	Artificial Intelligence (SIE)	Kevin Night, Elaine Rich, Nair B,	McGraw Hill

Reference Books:

S. No.	Title	Authors	Publisher
1	Artificial and Machine Learning	Vinod Chandra SS, Anand Hareendran S,	PHI Learning
2	Introduction to AI and ES	Dan W. Patterson	Pearson Education
3	Artificial Intelligence	G. Luger, W. A. Sttubblefield	Addison Wesley Longman
4	Principles of Artificial Intelligence	N. J. Nilson,	Narosa Publishing House
5	Machine Learning	Tom Mitchell	Tata McGraw Hill India