COURSE STRUCTURE OF DIPLOMA IN ECE
AND
FULL -LENGTH SYLLABUS OF ECE-THIRD YEAR

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

NEW COURSE STRUCTURE – To be effective for Diploma 2023-24
Based on CBCS system & OBE model
Recommended scheme of study
(For Diploma in Electronics & Communications Engineering)

Semester of Study (Recommended)	Category of course	Course Code	Subjects	Mode of delivery & credits *L-Lecture; T-Tutorial; P-Practical*			Total Credits *C-Credits*
				L	T	P	C
			THEORY				
FIFTH	PC	DEC 501	Digital Communication	3	0	0	3
		DEC 503	Embedded Systems	3	0	0	3
	PE	DPE 531/532/533	PE-II	3	0	0	3
		DPE 534/535/536	PE-III	3	0	0	3
	OE	DOE 531/532/533	OE-II [Courses from other Branches]	3	0	0	3
			SESSIONAL				
	PC	DEC 502	Digital Communication Lab	0	0	2	1
		DEC 504	Embedded Systems Lab	0	0	2	1
		DEC 506	Control & Instrumentation Lab	0	0	2	1
	Summer Internship	DSI 531	Summer Internship-II (4 weeks) after IV Semester	0	0	0	4
	Project	DPR 531	Project	0	0	4	2
			TOTAL CREDITS				**24**
			Total Lectures Per Week			**25**	
			THEORY				
SIXTH	PC	DEC 601	Information Theory and Coding	3	0	0	3
		DEC 603	Mobile and Wireless Communication	3	0	0	3
	PE	DPE 631/632/633	PE-IV	3	0	0	3
	OE	DOE 631/632/633	OE-III [Courses from other Branches]	3	0	0	3
	HSS	DHS 601	Entrepreneurship and Startup	3	1	0	4
	Mandatory Course	DAU 601	Indian Constitution	2	0	0	0 (Non-credit)
			SESSIONAL				
	PE	DPE 634/635/636	PE-V	0	0	2	1
	Major Project	DPR 631	Project	0	0	4	2
	Seminar	DSE631	Comprehensive Viva	1	0	0	1
			TOTAL CREDITS				**20**
			Total Lectures Per Week			**25**	
			GRAND TOTAL FOR THIRD YEAR				**44**

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

PROGRAMME ELECTIVES (PE)*

SEMESTER	Code no.	Name of the PE courses	Prerequisite/ Co-requisite courses with code	L	T	P	C
		PE-I					
SEM-IV	DPE 431	Electronic Equipment Maintenance	Basic Electronics	3	0	0	3
	DPE 432	Electronics Devices	Basic Electronics	3	0	0	3
	DPE 433	Computer System Architecture	Digital Electronics	3	0	0	3
	DPE 434	Signals and Systems	Electric Circuits and Network	3	0	0	3
		PE-II					
SEM- V	DPE 531	Industrial Automation	Electronic Measurements and Instrumentation	3	0	0	3
	DPE 532	Control System	Signals and Systems	3	0	0	3
	DPE 533	Introduction to IOT	Microprocessor and Microcontroller	3	0	0	3
		PE-III					
SEM-V	DPE 534	Microwave and RADAR	Analog Communication	3	0	0	3
	DPE 535	Optical Communication and Networking	Analog Communication	3	0	0	3
	DPE 536	Introduction to Antenna	Analog Communication	3	0	0	3
		PE-IV					
SEM-VI	DPE 631	Satellite Communication	Digital Communication	3	0	0	3
	DPE 632	Data Communication and Networking	Digital Communication	3	0	0	3
	DPE 633	Programmable Logic Controllers	Microprocessor and Microcontroller	3	0	0	3
		PE-V [Sessional]					
SEM-VI	DPE 634	Microwave and Antenna Lab	Analog Communication	0	0	2	1
	DPE 635	Programmable Logic Controllers Lab	Microprocessor and Microcontroller	0	0	2	1
	DPE 636	Wireless Communication and Networking Lab	Digital Communication	0	0	2	1

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

OPEN ELECTIVES (OE)*

SEMESTER	Code No.	Name of the OE courses	Prerequisites courses with code	L	T	P	C
		OE-I					
FOURTH	DOE 431	Digital Electronics and Application	N/A	3	0	0	3
	DOE 432	Analog Electronics and Applications	N/A	3	0	0	3
	DOE 433	Circuit Theory and Application	N/A	3	0	0	3
		OE- II					
FIFTH	DOE 531	Introduction to Communication System	N/A	3	0	0	3
	DOE 532	Sensors and Transducers	N/A	3	0	0	3
	DOE 533	Consumer Electronics	N/A	3	0	0	3
		OE- III					
SIXTH	DOE 631	Bio-Medical Electronics	N/A	3	0	0	3
	DOE 632	Modern Instrumentation System	N/A	3	0	0	3
	DOE 633	IoT and its Applications	N/A	3	0	0	3
*OPEN ELECTIVES TO BE OPTED ONLY BY OTHER DEPARTMENT STUDENTS							

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

INFORMATION THEORY AND CODING

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DEC 601		COURSE TITLE: Information Theory and Coding					
COMPULSORY / OPTIONAL: Programme Core							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: Students are expected to:

1. Understand the basic principles of information theory and coding.
2. Learn about entropy, mutual information, and their applications in communication.
3. Analyze source coding techniques for efficient data compression.
4. Explore error-detecting and error-correcting codes.
5. Study the applications of coding in modern communication systems.

COURSE OUTCOMES: After the completion of this course, students will be able to

CO1	Understand the key concepts of information theory, including entropy and mutual information.
CO2	Analyze the source coding techniques and their impact on data compression.
CO3	Apply the error-detecting and error-correcting codes.
CO4	Evaluate channel capacity and performance of communication systems.
CO5	Design the applications of coding in advanced communication technologies.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Information Theory:** 1.1 Overview of Information Theory 1.2 Entropy and Its Properties 1.3 Mutual Information and Channel Capacity 1.4 Information Rate 1.5 Applications of Information Theory in Communication Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
2	**Source Coding Techniques:** 2.1 Introduction to Source Coding 2.2 Shannon's Source Coding Theorem 2.3 Huffman Coding 2.4 Lempel-Ziv Coding 2.5 Arithmetic Coding Course Outcome: CO1, CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
3	**Error-Detecting and Error-Correcting Codes:** 3.1 Types of Errors in Communication Systems 3.2 Parity Check Codes 3.3 Cyclic Redundancy Check (CRC) 3.4 Hamming Codes 3.5 Block and Convolutional Codes Course Outcome: CO1, CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
4	**Channel Coding and Capacity:** 4.1 Shannon's Channel Capacity Theorem 4.2 Noisy Channel Coding Theorem 4.3 Channel Models: Binary Symmetric Channel, Binary Erasure Channel 4.4 Trade-off Between Bandwidth and Power 4.5 Error Performance Analysis Course Outcome: CO1, CO3, CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)

5	**Applications of Information Theory and Coding:** 5.1 Applications in Data Compression 5.2 Applications in Cryptography 5.3 Applications in Wireless Communication 5.4 Role in Modern Networking 5.5 Future Trends in Coding Theory Course Outcome: CO1, CO3, CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)

Text Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Elements of Information Theory	Thomas M. Cover, Wiley,2nd Edition, 2006.	978-0471241959
2.	Information Theory, Coding and Cryptography	Ranjan Bose, Tata McGraw-Hill, 2nd Edition, 2008.	978-0070669015
3.	Introduction to Error Control Codes	Salvatore Gravano, Oxford University Press, 1st Edition, 2007.	978-0198562311
4.	Modern Coding Theory	Tom Richardson, Rudiger Urbanke, Cambridge University, 1st Edition, 2008.	978-0521852296

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Information and Coding Theory	Gareth A. Jones, Springer, 2nd Edition, 2000.	978-1852336224
2.	Information Theory and Reliable Communication	Robert G. Gallager, Wiley, 1st Edition, 1968.	978-0471290483
3.	Fundamentals of Information Theory and Coding Design	Roberto Togneri, Christopher J.S. DeSilva, CRC Press, 2nd Edition, 2003	978-0849339569

E-REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc24_ee47/preview
2. https://nptel.ac.in/courses/117101053
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-441-information-theory-spring-2010/

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	1	2	2	3	3	3	3	2	2	2
2	1	3	3	3	1	3	3	2	2	2
3	1	2	2	2	2	3	3	2	2	2
4	1	2	2	2	2	2	3	2	2	2
5	1	2	2	2	2	3	3	2	2	2

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

MOBILE AND WIRELESS COMMUNICATION

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 603			COURSE TITLE: Mobile and Wireless Communication				
COMPULSARY: Core							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: This course enables students to understand the working principles, architecture, and technological evolution of mobile communication systems. It builds competencies in mobile hardware, network planning, interference management, and emerging digital standards, preparing them for careers in telecommunications and wireless communication industries.

COURSE OUTCOMES: After completion of the course the students will be able to:

CO1	Describe the basic concepts, evolution, and key terminologies of mobile communication systems and their applications in modern wireless technologies.
CO2	Explain the architecture, working principles, and functionalities of mobile units, including transmitters, receivers, and control units.
CO3	Analyse the principles of cellular systems, including frequency reuse, handoff mechanisms, and interference management for improving system performance
CO4	Compare and evaluate different digital cellular technologies such as GSM and CDMA, focusing on architecture, channel structure, and security features.
CO5	Summarize and differentiate emerging wireless communication systems, their features, services, and challenges in the context of next-generation networks.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	TITLE: INTRODUCTION TO MOBILE COMMUNICATION SYSTEM 1.1 Evolution of mobile radio communication 1.2 Mobile radio system around the world 1.3 Related definition-base station, control channel, forward channel, reverse channel etc. 1.4 Examples of wireless communication system such as paging system, cordless telephone system 1.5 Cellular telephone system-functional blocks and description of working process. Course Outcome: CO1 ,CO5 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
2	TITLE: MOBILE UNIT 1.1 Introduction- Block Diagram and operation of mobile unit 1.2 Frequency synthesizer-Block diagram and operation 1.3 Transmitter- Block diagram and operation 1.4 Receiver- Block diagram and operation 1.5 Control & Logic Unit- Block diagram and operation Course Outcome: CO2,CO4 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
3	TITLE: THE CELLULAR CONCEPT 1.1 Introduction to basic cellular system- Frequency reuse, Hand off, Type of hand off 1.2 Interference & system capacity- Co channel interference & system capacity, 1.3 Adjacent channel Interference 1.4 Channel planning for wireless system 1.5 Improving coverage and capacity in cellular system- Cell splitting, Sectoring, Repeater for range extension, Micro cell zone concept. Course Outcome: CO3 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)

4	TITLE: DIGITAL CELLULAR MOBILE SYSTEMS 1.1 G.S.M -system architecture, services & features, radio subsystems, channel types, 1.2 Message & call processing in GSM, Privacy & security in GSM 1.3 Signal system no.7 (ss7)—performance and services 1.4 CDMA digital cellular standard IS-95- system architecture, frequency & channel specification 1.5 IS.95 channel structure- Forward & Reverse channel and modulation process. Course Outcome:CO2, CO3, CO4 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
5	TITLE: MODERN WIRELESS COMMUNICATION SYSTEM 1.1 IMT 2000 – Features and services 1.2 3G CDMA 2000– Features and services 1.3 3GW-CDMA (UMTS) – Features and services 1.4 3G- TD-SCDMA (synchronous) – Features and services 1.5 Wireless local loop & LMDS Course Outcome: CO1, CO4,CO5 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Wireless Communication: Principles & Practice	T.S. Rappaport, Pearson Education	**ISBN-10**: 0130422320 **ISBN-13**: 978-0130422323
2	Mobile Cellular Telecommunication	William Lee, Tata McGraw Hill	**ISBN-10**: 0071134833 **ISBN-13**: 978-0071134835
3	Mobile & Personal communication services & system	Raj Pandya Prentice Hall of India	**ISBN-10**: 8120324972 **ISBN-13**: 978-8120324979

E-REFERENCES:

1. https://nptel.ac.in/courses/108/104/108104140/
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-450-principles-of-digital-communications-i-fall-2006/
3. https://en.wikibooks.org/wiki/Wireless_Communication
4. https://www.electronics-tutorials.ws/communication/mobile-communications.html
5. https://www.itu.int/en/ITU-T/studygroups/2022-2024/05/Pages/mobile.aspx

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	3	2	1	1	2	1	2	3	2	1
2	3	2	2	2	1	1	2	3	3	2
3	3	3	3	2	2	1	2	3	2	3
4	3	3	3	2	2	1	2	3	2	3
5	3	2	2	1	2	2	3	3	2	3

Nitish

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

SATELLITE COMMUNICATION

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DPE 631			COURSE TITLE: Satellite Communication				
PROGRAMME ELECTIVE:PE IV							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: Satellite communication plays a crucial role in modern telecommunication, broadcasting, navigation, remote sensing, and defence applications. This course provides students with a comprehensive understanding of satellite systems, their working principles, and their applications. The structured modules cover fundamental concepts, technical aspects, and advancements in satellite communication, enabling students to grasp the practical and theoretical aspects of the field.

COURSE OUTCOMES: After completion of the course the students will be able to:

CO1	Explain the basic elements and principles of satellite communication systems including orbital patterns and satellite links.
CO2	Illustrate satellite frequency allocations, coverage concepts, and interpret earth station components and layout.
CO3	Describe the functional subsystems of satellites and explain their roles in satellite operations including TT&C and AOCS.
CO4	Analyse the components of a satellite communication channel and examine transponder operation and signal impairments.
CO5	Evaluate advanced satellite communication technologies and assess their applicability to modern communication

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**MODULE 1: INTRODUCTION TO SATELLITE COMMUNICATION** 1.1 Block Diagram of Elements of a Satellite Communication System 1.2 Orbital Patterns of Satellites: Elliptical Orbit, Parabolic Orbit, and Geo-stationary Orbit 1.3 Advantages of Geo-stationary Satellites 1.4 Satellite Links: Uplink, Downlink, and Cross-link 1.5 Look Angle, Angle of Elevation, and Azimuth Angles Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
2	**MODULE 2: SATELLITE FREQUENCY BANDS AND COVERAGE** 2.1 Uplink and Downlink Frequency Bands Used in Satellite Communication 2.2 Satellite Footprint and Coverage Area 2.3 Station Keeping and Its Importance 2.4 Block Diagram of a Satellite Earth Station 2.5 Basic Working Principles of Earth Station Components Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
3	**MODULE 3: SATELLITE SUBSYSTEMS** 3.1 Block Diagram of Satellite Subsystems 3.2 Functions of a Satellite and Power Subsystem (Concept Only) 3.3 Solar Eclipse and Its Impact on Satellite Power Systems 3.4 Telemetry, Tracking, and Command (TT&C) Subsystem 3.5 Altitude and Orbit Control System Course Outcome: CO3, CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)

4	**MODULE 4: SATELLITE COMMUNICATION CHANNEL** 4.1 Communication Channel Subsystem 4.2 Block Diagram of a Typical Satellite Transponder 4.3 Transponder Functions and Frequency Conversion 4.4 Uplink and Downlink Signal Processing 4.5 Interference and Noise in Satellite Communication Channels Course Outcome: CO4, CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
5	**MODULE 5: ADVANCED SATELLITE COMMUNICATION SYSTEMS** 5.1 Modern Trends in Satellite Communication 5.2 Satellite-Based Internet and Navigation Systems 5.3 Mobile Satellite Communication and VSAT Systems 5.4 Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) Satellites 5.5 Future Prospects and Applications of Satellite Communication Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)

REFERENCE BOOKS:

S. No.	Title	Author, Publisher, Edition, and Year of Publication	ISBN
1	Satellite Communications	Dennis Roddy, McGraw Hill, 4th Edition, 2006	9780071462983
2	Principles of Satellite Communication	H.D. Sharma, Tata McGraw Hill, 2010	9780070702004
3	Satellite Communication Systems	Gerard Maral, Wiley, 5th Edition, 2009	9780470714584
4	Fundamentals of Satellite Communication	B.N. Agrawal, Wiley, 2007	9788126513665

E-REFERENCES:

1. https://nptel.ac.in/courses/117101055
2. https://archive.org/details/satellitecommuni00rodd
3. https://ieeexplore.ieee.org/
4. https://www.nasa.gov/stem-ed-resources/beginners-guide-to-satellites.html
5. https://www.itu.int/en/publications/

CO VS PO MAPPING

CO	PO							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	–	–	–	–	1	3	–	1
2	3	2	–	2	–	–	1	3	2	1
3	3	2	–	2	–	–	2	3	2	2
4	3	3	2	3	–	–	2	3	2	3
5	3	3	3	2	1	2	3	3	2	3

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

DATA COMMUNICATION AND NETWORKING

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DPE 632		COURSE TITLE: Data Communication and Networking					
COMPULSORY / OPTIONAL: PE-IV							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: Students are expected to:

1. Understand the basic principles of data communication and networking.
2. Explore various networking models and their functionalities.
3. Analyze network protocols and their applications in communication systems.
4. Gain knowledge about wired and wireless networking technologies.
5. Learn about emerging trends in networking such as IoT and 5G.

COURSE OUTCOMES: After the completion of this course, students will be able to

CO1	Understand the fundamental concepts and principles of data communication systems.
CO2	Design the functionalities of networking models such as OSI and TCP/IP.
CO3	Analyze and evaluate network protocols and data transmission techniques.
CO4	Apply the working principles of wired and wireless networking technologies.
CO5	Evaluate advanced topics and trends in data communication and networking.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Data Communication:** 1.1 Overview of Data Communication 1.2 Components of Communication Systems 1.3 Data Flow (Simplex, Half-Duplex, Full-Duplex) 1.4 Types of Signals: Analog and Digital 1.5 Data Transmission Techniques Course Outcome: CO1, CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
2	**Networking Models:** 2.1 Introduction to Networking 2.2 OSI Model: Layers and Their Functions 2.3 TCP/IP Model: Protocol Suite and Comparison with OSI 2.4 Network Topologies 2.5 Switching Techniques: Circuit, Packet, and Message Switching Course Outcome:CO1, CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
3	**Network Protocols and Standards:** 3.1 Introduction to Network Protocols 3.2 Ethernet Protocol and LAN Standards 3.3 IP Addressing and Subnetting 3.4 Routing Protocols (RIP, OSPF, BGP) 3.5 Application Layer Protocols (HTTP, FTP, SMTP) Course Outcome: CO1, CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
4	**Wired and Wireless Networking:** 4.1 Introduction to Wired Networks: Ethernet, DSL 4.2 Wireless Technologies: Wi-Fi, Bluetooth, Cellular Networks 4.3 Basics of Wireless Sensor Networks 4.4 Network Security Fundamentals 4.5 Encryption and Authentication Techniques Course Outcome: CO1, CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
5	**Advanced Networking Trends:**

	5.1 Internet of Things (IoT): Architecture and Applications 5.2 Cloud Computing and Networking 5.3 Introduction to 5G Networks 5.4 Software-Defined Networking (SDN) 5.5 Emerging Trends in Networking Technologies Course Outcome: CO1, CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)

Text Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Data Communications and Networking	Behrouz A. Forouzan, McGraw-Hill Education, 5th Edition, 2012.	978-0073376221
2.	Computer Networking: A Top-Down Approach	James F. Kurose, Keith W. Ross, Pearson Education, 7th Edition, 2016.	978-0133594149
3.	Introduction to Networking	Richard Fox, CRC Press, 2nd Edition, 2015.	978-1482238669
4.	Wireless Communications and Networks	William Stallings, Pearson Education, 2nd Edition, 2005.	978-0131918351

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Networking All-in-One	Doug Lowe, Wiley, 8th Edition, 2021.	978-1119689032
2.	Computer Networks	Andrew S. Tanenbaum, Pearson Education, 5th Edition, 2010.	978-0132126953
3.	High-Performance Communication Networks	Jean Walrand, Pravin Varaiya, Elsevier, 2nd Edition, 2000.	978-1558605749

E-REFERENCES:

1. https://ocw.mit.edu/courses/6-263j-data-communication-networks-fall-2002/#:~:text=Course%20Description,including%20routing%20and%20flow%20control.
2. https://www.ntnu.edu/studies/courses/DCST1006#:~:text=Skills:,networks%20to%20meet%20future%20needs.
3. https://onlinecourses.nptel.ac.in/noc22_ee61/preview#:~:text=Course%20layout,%2C%20Network%20slicing%2C%20cognitive%20Networks.

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	1	2	2	3	3	3	3	2	2	2
2	1	3	3	3	1	3	3	2	2	2
3	1	2	2	2	2	3	3	2	2	2
4	1	2	2	2	2	2	3	2	2	2
5	1	2	2	2	2	3	3	2	2	2

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

PROGRAMMABLE LOGIC CONTROLLERS

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DPE633			COURSE TITLE: Programmable Logic Controllers				
OPTIONAL: Programme Elective-IV							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: This course enables the students to:

1. Understand the fundamentals Programmable Logic Controllers systems.
2. Identify the PLC Configuration.
3. Design, edit, test, and document PLC Ladder Logic Programs.
4. Diagnose and troubleshoot PLCs.

COURSE OUTCOMES: After the completion of this course, students will be able to

CO1	Describe the fundamentals of Programmable Logic Controller (PLC) systems and their configurations.
CO2	Design, edit, and test PLC ladder logic programs for basic control applications.
CO3	Analyze basic PLC applications and perform diagnosis and troubleshooting of PLC systems.
CO4	Apply advanced programming techniques, including mnemonic programming, in PLC development.
CO5	Assess the use of PLCs for analog data handling and the implementation of safety interlocks.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Programmable Controllers** 1.1 Introduction, Principles of Operation: AND, OR, AND-OR, Architecture of Programmable Controllers. 1.2 PLC Architecture, Scan Cycle, Input/output System, Programming Devices. Diagnostics, 1.3 Programming the Programmable controller: Programming Languages. 1.4 Ladder Diagram Instructions, Boolean Mnemonics, Functional Blocks. 1.5 Software, Configuration, Applications of PLC. Course Outcome: CO1 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
2	**Ladder Diagram Fundamentals** 2.1 Introduction, Basic Components and Their Symbols. 2.2 Control Transformer, Fuses, Switches, Indicator Lamps, Relays. 2.3 Fundamental of Ladder Diagrams: Basic Diagram Framework. 2.4 Wiring, Reference Designators, Boolean Logic and Relay Logic 2.5 Machine Control Terminology. Course Outcome:CO1 CO2 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
3	**Fundamental PLC Programming** 3.1 PLC Programming: Introduction, Physical components vs. Program Components. 3.2 Example Problem- Lighting Control, Internal Relays 3.3 Oscillator, Holding Contacts, Always-ON and Always-OFF Contacts. 3.4 Ladder Diagrams Having More Than One Rung. Course Outcome: CO2 CO3 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
4	**Advanced Programming Techniques and Mnemonic Programming Code** 4.1 Introduction, Ladder Program Execution Sequence. 4.2 Counters, Timers, Flashers and control Zones. 4.3 Introduction Mnemonic Programming

	4.4 AND Ladder Rung, Entering Normally Closed Contacts. 4.5 OR Ladder Rung, Simple Branches, Complex Branches Course Outcome:CO2 CO3 CO4 Teaching Hours : 10 hrs Marks: 30 (PE+FINAL)
5	**Analog I/O, System Integrity and Safety** 1.1 Introduction to Analog Input: Specifying an Analog Input, Analog Output, Analog Data Handling. 1.2 Analog Input Potential Problems. 1.3 Introduction to System Integrity and Safety procedure. 1.4 Equipment Temperature Considerations, Fail-Safe Wiring and Programming, 1.5 Safety Interlocks: Interlock Switches, Pressure Sensitive Mat Switch, Pull Ropes, Light Curtains. Course Outcome: CO5 Teaching Hours : 6 hrs Marks: 10 (PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Computer-Based Industrial control	Krishna Kant, Prentice Hall India Learning Private Limited, Standard Edition, 2010.	9788120339880
2.	Programmable Logic Controllers: Programming Methods and Applications	John R. Hackworth, Frederick D. Hackworth, Jr., PHI, 2003.	0130607185

E-REFERENCES:

1. https://www.youtube.com/watch?app=desktop&v=ObYwsUhr3Y0&t=0s.
2. https://www.youtube.com/watch?v=MS3qJq2jvu0.

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	3	2	2	3	2	2	2	3	2	3
2	3	3	3	3	2	2	2	3	3	3
3	3	3	3	3	2	2	2	3	3	3
4	3	3	3	3	2	2	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3

Nitish

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

BIO-MEDICAL ELECTRONICS

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DOE 631			COURSE TITLE: Bio-Medical Electronics				
OPTIONAL: Open Elective-III							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: This course enables the students to:

1. Understand the Anatomy and Physiology.
2. Identify and understand the signals from physiological parameters and the transducers as a control element.
3. Study standard biomedical recorders for medical diagnostic & therapeutic problems.
4. Understand the principles of modern technology tools necessary for the patient monitoring systems.
5. Understand the principles of safety precautions of biomedical equipment for proper operations and maintenance.

COURSE OUTCOMES: After completion the student will be able to:

CO1	Explain the fundamental concepts and applications of bio-potential electrodes.
CO2	Apply suitable transducers for measuring physiological signals effectively.
CO3	Analyze and evaluate medical diagnostic and therapeutic problems using biomedical recording systems.
CO4	Demonstrate the use of modern technological tools in patient monitoring systems.
CO5	Summarize the procedures and distinguish between different practices for servicing and maintenance of biomedical equipment.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Anatomy and Physiology** 1.1 Elementary ideas of cell structure. 1.2 Heart and circulatory system, Central nervous system, Muscle action, Respiratory system. 1.3 Body temperature and reproduction system. 1.4 Overview of Medical Electronics Equipment- classification, application and specifications of diagnostic. 1.5 Method of operation of these instruments. Course Outcome: CO1 CO2 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
2	**Electrodes** 2.1 Bioelectric signals, Bio electrodes, Electrode, Electrode tissue interface. 2.2 contact impedance, Types of Electrodes. 2.3 Electrodes used for ECG, EEG. 2.4 **Transducers**: Pressure transducer, flow transducer, temperature transducer. 2.5 Pulse sensor, respiration sensor. Course Outcome: CO1 CO2 Teaching Hours : 10 hrs Marks: 30 (PE+FINAL)
3	**Bio Medical Recorders** 3.1 Block diagram, description and application of following instruments. 3.2 ECG Machine. 3.3 EEG Machine. 3.4 EMG Machine. Course Outcome: CO2 CO3 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
4	**Patient Monitoring Systems** 4.1 Heart rate measurement.

	4.2 Pulse rate measurement. 4.3 Respiration rate measurement. 4.4 Blood pressure measurement. 4.5 Principle of defibrillator and pace maker. Course Outcome: CO1 CO2 CO4 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
5	**Safety Aspects of Medical Instruments** 5.1 Gross current shock. 5.2 Micro current shock. 5.3 Special design from safety considerations. 5.4 Safety standards. Course Outcome: CO3 CO4 CO5 Teaching Hours : 6 hrs Marks: 10 (PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Handbook Of Biomedical Instrumentation	Raghbir Singh Khandpur, McGraw Hill Education (India) Private Limited, 3rd, 2014.	978-9339205430
2.	Biomedical Instrumentation and Measurements	Cromwell, Prentice Hall India Learning Private Limited; 2nd edition, 1990	978-8120306530
3.	Introduction to Biomedical Electronics	Edward J. Bukstein, Howard W Sams, U.S.	978-0672210051

E-REFERENCES:

3. https://nptel.ac.in/courses/108108180.
4. https://www.youtube.com/playlist?list=PLKcjQ_UFkrd7zbPHRkDpB7i113wDG_Rb3.

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	3	2	2	2	3	2	2	3	2	3
2	3	3	3	3	3	2	2	3	3	3
3	3	3	3	3	3	3	2	3	3	3
4	3	3	3	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3

Nitish

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

MODERN INSTRUMENTATION SYSTEM

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DOE632			COURSE TITLE: Modern Instrumentation System				
OPTIONAL: Open Elective-III							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: This course enables the students to:

1. Understand the fundamentals of Instrumentation.
2. Demonstrate the working principle of various Transducers.
3. Comprehend the recent developments in Instrumentation.
4. Understand about Data Acquisition system (DAS).
5. Familiar with the various measuring instruments.

COURSE OUTCOMES: After the completion of the course, students will be able to:

CO1	Explain the various elements of basic instrumentation systems and their individual components.
CO2	Analyze different types of transducers used for measuring various physical variables.
CO3	Compare and evaluate modern instruments used for measurement in recent applications.
CO4	Describe the concept, structure, and functioning of Data Acquisition Systems (DAS).
CO5	Summarize the principles and differentiate the operation of various digital instruments.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Fundamentals of Instrumentation** 1.1 Basic purpose of instrumentation. 1.2 Basic block diagram (transduction, signal conditioning, signal presentation) and their function. 1.3 Construction, working and application of switching devices- Push button, limit Switch, float switch, pressure switch. 1.4 Thermostat, Electromagnetic relay. Course Outcome: CO1 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
2	**Transducers** 2.1 Construction and Principle of Resistive Transducer. 2.2 Construction and principle of Inductive transducers- L.V.D.T. and their Applications. 2.3 Construction and Principle of Capacitive Transducers. 2.4 Piezo-Electric Transducer. 2.5 Photo voltaic cells. Course Outcome: CO1 CO2 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
3	**Recent Developments in Instrumentation and Measurements** 3.1 Computer-Aided measurements. 3.2 Smart Sensors. 3.3 Micro-sensors. 3.4 Programmable Logic Controllers (PLC) and its applications. Course Outcome: CO1 CO2 CO3 Teaching Hours : 6 hrs Marks: 10 (PE+FINAL)

4	**Data Acquisition System** 4.1 Generalized DAS- Block diagram and description of each section. 4.2 Data conversion- Construction and working of Analog to Digital conversion. 4.3 Digital to Analog conversion- Construction and Working. 4.4 Digital Display Device- operation and its application of Seven Segment Display, Dot Matrix Display, LED and LCD applications. 4.5 Concept and methods of Data Transmission. Course Outcome: CO2 CO3 CO4 Teaching Hours : 10 hrs Marks:30 (PE+FINAL)
5	**Miscellaneous Electronic Instruments** 5.1 Digital Multimeter. 5.2 Function Generators. 5.3 Voltage and Frequency Measurement using CRO. 5.4 Digital Storage Oscilloscopes. 5.5 Digital Spectrum Analyzers. Course Outcome: CO4 CO5 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electrical & Electronic Measurements & Instrumentations	A.K. Sawhney, Dhanpat Rai & Co. (P) Limited, 2015.	978-8177001006
2.	Electronics and instrumentation	Mehta, V.K., S.Chand and company Pvt Ltd, 3rd, 2010	81-219-2729-3
3.	Electronic Instrumentation and Measurements	H S Kalsi, McGraw-Hill; 4th edition, 2019.	978-0-470-82353-8

E-REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc23_ee112/.
2. https://youtube.com/playlist?list=PLbRMhDVUMngcoKrA4sH-zvbNVSE6IpEio&si=QbS5tZEZqVgYn46T.

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	3	2	2	2	2	2	2	3	2	3
2	3	3	2	2	2	2	2	3	2	3
3	3	3	3	3	3	3	2	3	3	3
4	3	2	3	3	2	3	3	3	2	3
5	3	3	3	3	2	3	3	3	3	3

Nitish

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

IOT AND ITS APPLICATIONS

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DOE 633			COURSE TITLE: IoT and its Applications				
OPTIONAL: OPEN Elective-III							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: Students are expected to:

1. Know the basics of IoT.
2. Know about Things and Connection.
3. Understand the role of Sensors, Actuators and Microcontrollers.
4. Know about Domain specific IoT.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Explain the basics of Internet of Things and role of Sensors, Actuators and Microcontrollers
CO2	Analyze Smart Homes.
CO3	Explain about Smart Grids
CO4	Summarize Smart Cities.
CO5	Exemplify Industrial IoT.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Internet of Things** 1.1 Introduction 1.2 Characteristics of IoT. 1.3 Applications of IoT 1.4 Sensors 1.5 Actuators Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
2	**Home Automation** 2.1 Introduction, Smart Lighting 2.2 Smart Appliances 2.3 Smart Appliances 2.4 Intrusion Detection 2.5 Smoke/Gas Detector Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
3	**Smart Grids** 3.1 Introduction 3.2 Characteristics of Smart Grids 3.3 Benefits of Smart Grids 3.4 Components of Smart Grids Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
4	**Smart Cities** 4.1 Introduction 4.2 Characteristics of Smart Cities 4.3 Challenges in Smart Cities 4.4 Smart Parking Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
5	**Industrial IoT (IIoT)** 5.2 Introduction 5.3 Manufacturing industry

	5.4 Healthcare service industry 5.5 Smart Dust 5.6 Drones Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)

Text Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Internet of Things	Jeeva Jose, Khanna Publishing, Edition 2018, Reprint 2019	978-93-86173-59-1

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Introduction to IoT and its Applications	T Balaji, Tbalaji Publication, First Edition, February 2021	978-81-952954-4-9
2.	Internet of Things A Hands-on Approach	Arshdeep Bahaga, Vijay Madisetti, Universities Press, Reprinted in 2021	978-81-7371-954-7

E-REFERENCES:

1. https://nptel.ac.in/courses/106/105/106105166/
2. https://www.coursera.org/learn/iot
3. https://www.iotforall.com/

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	1	2	2	2	1	3	3	2	2	2
2	1	3	3	2	1	3	3	2	2	2
3	1	2	2	2	1	3	3	2	2	2
4	1	2	2	2	1	2	3	2	2	2
5	1	2	2	2	1	3	3	2	2	2

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

ENTREPRENEURSHIP AND STARTUP

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DHS 601			COURSE TITLE: Entrepreneurship and Startup				
COMPULSORY / OPTIONAL: COMPULSORY(HSS)							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	1	0	4	4	50	50	100

RATIONALE: Students are expected to:

1. Understand the fundamentals of entrepreneurship and startup ecosystems.
2. Explore data-driven business opportunities and strategies for startups.
3. Learn how to design, develop, and execute a startup business plan.
4. Gain insights into funding, marketing, and scaling startups in the digital age.
5. Develop entrepreneurial skills to address real-world challenges through innovative solutions.

COURSE OUTCOMES: After the completion of this course, students will be able to

CO1	Understand the entrepreneurship, startup processes, and ecosystem components.
CO2	Analyze data-driven business opportunities and market needs.
CO3	Develop a comprehensive business plan for a startup using strategic tools.
CO4	Apply knowledge of funding, marketing, and operations to manage a startup effectively.
CO5	Evaluate the case studies of successful startups and emerging trends in data-driven entrepreneurship.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Entrepreneurship and Startups:** 1.1 Overview of Entrepreneurship and Innovation 1.2 Characteristics of Entrepreneurs 1.3 Types of Startups and Their Ecosystems 1.4 Role of Technology in Startups 1.5 Social and Economic Impact of Startups Course Outcome: CO1, CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
2	**Data-Driven Business Opportunities:** 2.1 Identifying Market Needs and Trends 2.2 Leveraging Data Analytics for Business Decision-Making 2.3 Competitive Analysis and Positioning 2.4 Digital Tools for Market Research 2.5 Case Studies on Data-Driven Startups Course Outcome: CO1, CO2, CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
3	**Business Plan Development:** 3.1 Key Components of a Business Plan 3.2 Value Proposition and Customer Segmentation 3.3 Revenue Models and Financial Planning 3.4 Strategic Planning and SWOT Analysis 3.5 Presentation and Pitching Techniques Course Outcome: CO1, CO2, CO3 Teaching Hours: 10 hrs Marks: 20 (PE+FINAL)
4	**Startup Funding and Marketing:** 4.1 Types of Funding: Bootstrapping, Angel Investors, Venture Capital 4.2 Crowdfunding Platforms and Mechanisms 4.3 Digital Marketing Strategies for Startups 4.4 Brand Building and Customer Engagement 4.5 Challenges in Scaling Startups Course Outcome:CO1, CO3, CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
5	**Emerging Trends and Case Studies:**

	5.1 Role of Artificial Intelligence in Startups 5.2 Big Data and IoT Applications in Startups 5.3 Sustainable and Social Entrepreneurship 5.4 Lessons from Successful Startups 5.5 Future Trends in Startup Ecosystems Course Outcome: CO1, CO3, CO5 Teaching Hours: 10 hrs Marks: 20 (PE+FINAL)

Text Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Entrepreneurship Development	S.S. Khanka, S. Chand Publishing, 4th Edition, 2021.	978-9352837200
2.	Startup Opportunities	Sean Wise, Brad Feld, Wiley, 1st Edition, 2017.	978-1119378189
3.	The Lean Startup	Eric Ries, Crown Publishing Group, 1st Edition, 2011.	978-0307887894
4.	Data-Driven Marketing	Mark Jeffery, Wiley, 2nd Edition, 2010.	978-0470504543

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Innovation and Entrepreneurship	Peter F. Drucker, Harper Business, 2006.	978-0060851132
2.	Zero to One	Peter Thiel, Blake Masters, Currency, 1st Edition, 2014.	978-0804139298
3.	Disciplined Entrepreneurship	Bill Aulet, Wiley, 1st Edition, 2013.	978-1118692286
4.	The Startup Owner's Manual	Steve Blank, Bob Dorf, Wiley, 1st Edition 2012.	978-1119690687

E-REFERENCES:

1. https://nptel.ac.in/
2. https://hbr.org/case-selections

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	1	2	2	3	3	3	3	2	2	2
2	1	3	3	3	1	3	3	2	2	2
3	1	2	2	2	2	3	3	2	2	2
4	1	2	2	2	2	2	3	2	2	2
5	1	2	2	2	2	2	3	2	2	2

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

INDIAN CONSTITUTION

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DAU 601			COURSE TITLE: Indian Constitution				
COMPULSORY / OPTIONAL: COMPULSORY (Mandatory Course)							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
2	0	0	2	0	50	50	100

RATIONALE: Students are expected to:

1. Understand the basic principles and structure of the Indian Constitution.
2. Gain knowledge of fundamental rights, duties, and directive principles.
3. Comprehend the roles and responsibilities of the legislature, executive, and judiciary.
4. Learn the significance of federalism and governance mechanisms in India.
5. Develop an appreciation of constitutional values and their relevance in contemporary times.

COURSE OUTCOMES: After the completion of this course, students will be able to

CO1	Understand the historical background and significance of the Indian Constitution
CO2	Apply the fundamental rights, duties, and directive principles of state policy.
CO3	Design the functioning of the legislature, executive, and judiciary in India.
CO4	Analyze the concept of federalism and its application in governance.
CO5	Evaluate constitutional values to modern societal challenges.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to the Indian Constitution:** 1.1 Historical Background and Evolution of the Constitution 1.2 Preamble and Its Significance 1.3 Salient Features of the Constitution 1.4 Amendments to the Constitution 1.5 Relevance of the Constitution in Modern India Course Outcome: CO1 Teaching Hours: 6 hrs Marks: 20 (PE+FINAL)
2	**Fundamental Rights and Duties:** 2.1 Fundamental Rights: Meaning, Importance, and Types 2.2 Directive Principles of State Policy 2.3 Fundamental Duties of Citizens 2.4 Differences Between Fundamental Rights and Directive Principles 2.5 Case Studies on Fundamental Rights Course Outcome: CO1, CO2 Teaching Hours: 6 hrs Marks: 20 (PE+FINAL)
3	**Legislature, Executive, and Judiciary:** 3.1 Structure and Functions of the Legislature 3.2 Role of the Executive: President, Prime Minister, and Council of Ministers 3.3 Independence and Powers of the Judiciary 3.4 Judicial Review and Activism 3.5 Inter-Relationship Between the Three Organs of Government Course Outcome: CO1, CO2, CO3 Teaching Hours: 6 hrs Marks: 20 (PE+FINAL)
4	**Federalism and Governance:** 4.1 Concept of Federalism in India 4.2 Division of Powers: Union, State, and Concurrent Lists 4.3 Role of Local Self-Governments 4.4 Cooperative Federalism 4.5 Challenges in Federal Governance Course Outcome: CO1, CO2, CO4 Teaching Hours: 6 hrs Marks: 20 (PE+FINAL)
5	**Constitutional Values and Contemporary Issues:**

	5.1 Importance of Constitutional Values in Society 5.2 Equality, Liberty, and Justice in Practice 5.3 Role of the Constitution in Social and Economic Development 5.4 Addressing Contemporary Challenges Through Constitutional Mechanisms 5.5 Case Studies on Constitutional Reforms Course Outcome: CO1, CO2, CO5 Teaching Hours: 6 hrs Marks: 20 (PE+FINAL)

Text Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Introduction to the Constitution of India	D.D. Basu, LexisNexis, 25th Edition, 2021	978-9391211819
2.	Indian Polity	M. Laxmikanth, McGraw-Hill Education, 6th Edition, 2021.	978-9354600353
3.	The Constitution of India	P.M. Bakshi, Universal Law Publishing, 15th Edition, 2020.	978-8131255262
4.	Our Constitution	Subhash Kashyap, National Book Trust, 5th Edition, 2019.	978-8123767624

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	The Oxford Handbook of the Indian Constitution	Sujit Choudhry, Madhav Khosla, Pratap Bhanu Mehta, Oxford University Press, 1st Edition, 2016.	978-0198704896
2.	Constitutional Law of India	H.M. Seervai, Universal Law Publishing, 4th Edition, 2015.	978-9350355295
3.	Working a Democratic Constitution	Granville Austin, Oxford University Press, 1st Edition,1999.	978-0195656105

E-REFERENCES:

1. https://nptel.ac.in/
2. https://ili.ac.in/ilr_win22.html

CO VS PO MAPPING

CO	PO						
	1	**2**	**3**	**4**	**5**	**6**	**7**
1	1	2	-	-	3	3	-
2	1	3	-	-	3	3	-
3	1	2	2	2	3	3	-
4	1	2	-	2	3	3	-
5	1	2	-	-	3	3	-

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

MICROWAVE AND ANTENNA LAB

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DPE 634			COURSE TITLE: Microwave and Antenna Lab				
PROGRAMME ELECTIVE: PE V							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

RATIONALE: The Microwave and Antenna Lab is designed to provide practical exposure to the fundamental concepts of microwave communication and antenna design, which are essential for Electronics and Communication Engineering (ECE) diploma students. This lab aims to bridge the gap between theory and real-world applications by enabling students to:

1. Understand Microwave Propagation & Components
2. Develop Skills in Antenna Measurement & Design
3. Enhance Problem-Solving Abilities
4. Apply Theoretical Knowledge to Practical Applications
5. Prepare for Industry and Research Opportunities

COURSE OUTCOMES: The student will be able to:

CO1	Explain the function and characteristics of microwave components and demonstrate the procedure for measuring microwave power using a power meter.
CO2	Apply standard measurement techniques to determine VSWR, reflection coefficient, attenuation, and insertion loss in microwave systems.
CO3	Analyse the radiation pattern of horn and dipole antennas and interpret their directional characteristics using experimental data.
CO4	Evaluate the gain and directivity of a Yagi-Uda antenna and analyse microstrip patch antenna parameters through experimental investigation.
CO5	Design and simulate experiments to measure impedance and bandwidth of helical antennas and explore beamforming techniques in smart antennas.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	Experiment 1: Study of Microwave Components and Their Characteristics Experiment 2: Measurement of Microwave Power Using Power Meter Course Outcome: CO1 Teaching Hours : 4 hrs Marks: 20 (PE+FINAL)
2	Experiment 3: Measurement of VSWR (Voltage Standing Wave Ratio) and Reflection Coefficient Experiment 4: Measurement of Attenuation and Insertion Loss Course Outcome: CO2 Teaching Hours : 4 hrs Marks: 20 (PE+FINAL)
3	Experiment 5: Study and Measurement of Radiation Pattern of a Horn Antenna Experiment 6: Measurement of Radiation Pattern of a Dipole Antenna Course Outcome: CO3 Teaching Hours : 4 hrs Marks: 20 (PE+FINAL)
4	Experiment 7: Measurement of Gain and Directivity of a Yagi-Uda Antenna Experiment 8: Study of Microstrip Patch Antenna and Its Parameters Course Outcome: CO4 Teaching Hours : 4 hrs Marks: 20 (PE+FINAL)
5	Experiment 9: Measurement of Impedance and Bandwidth of a Helical Antenna Experiment 10: Study of Smart Antennas and Beamforming Techniques Course Outcome: CO5 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)

Nitish

REFERENCE BOOKS:

S. N.	Title	Author	Publisher	Edition & Year	ISBN
1	Microwave Engineering	David M. Pozar	Wiley	4th Edition, 2011	978-0470631553
2	Antennas and Wave Propagation	John D. Kraus, Ronald J. Marhefka	McGraw-Hill	4th Edition, 2010	978-0070671553
3	Microwave Devices and Circuits	Samuel Y. Liao	Pearson	3rd Edition, 2003	978-0131232307
4	Antenna Theory: Analysis and Design	Constantine A. Balanis	Wiley	4th Edition, 2016	978-1118642061

E-REFERENCES:

3. https://www.electronics-tutorials.ws/
4. https://www.microwaves101.com/
5. https://www.rfwireless-world.com/

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	3	2	–	3	–	–	1	3	2	2
2	3	2	–	3	–	–	1	3	3	2
3	3	2	–	3	–	–	1	3	2	3
4	3	2	2	3	–	1	2	3	2	3
5	3	2	3	3	1	2	3	3	3	3

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

PROGRAMMABLE LOGIC CONTROLLER LAB

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DPE 635			COURSE TITLE: Programmable Logic Controllers Lab				
OPTIONAL: Programme Elective-V							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

RATIONALE: This course enables the students to:

1. Understand the fundamentals of PLC architecture & PLC Programming.
2. Develop Ladder diagram for Traffic Light Control System & Seven Segment Display .
3. Develop Ladder diagram for Elevator System.
4. Develop Ladder diagram for Car Parking System.
5. Develop Ladder diagram for Stepper motor /Temperature control

COURSE OUTCOMES: After the completion of the course, students will be able to

CO1	Understand the working principles and configurations of commonly used Programmable Logic Controllers (PLCs) and their programming techniques.
CO2	Apply knowledge to design and create ladder diagrams for Traffic Light Control Systems and Seven Segment Display applications.
CO3	Develop ladder diagrams for controlling stepper motors in automation systems.
CO4	Construct ladder diagrams for Car Parking System automation.
CO5	Design and implement ladder diagrams for Tank Level Control applications.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	1.1 Introduction to ladder programming & to implement Basic Logic Gates. 1.2 Develop, Simulate and Test Ladder diagram for Door Bell Operation. Course Outcome: CO1 CO2 Teaching Hours : 4 hrs
2	2.1 Develop, Simulate and Test Ladder diagram for Traffic Light Control System 2.2 Develop, Simulate and Test Ladder diagram for Seven Segment Display. Course Outcome: CO1 CO2 Teaching Hours : 4 hrs
3	3.1 Develop, Simulate and Test Ladder diagram for an Elevator System. 3.2 Develop, Simulate and Test Ladder Diagram for stepper motor control in Forward and Reverse direction. Course Outcome: CO1 CO3 Teaching Hours : 4 hrs
4	4.1 Develop, Simulate and Test Ladder diagram for Car Parking System. 4.2 Develop, Simulate and Test Ladder diagram for Bottle Filling system. Course Outcome:CO1 CO4 Teaching Hours : 4 hrs
5	5.1 Perform Stepper motor /Temperature control using PLC. 5.2 Develop, Simulate and Test Ladder diagram for Tank Level Control. Course Outcome: CO1 CO5 Teaching Hours : 4 hrs

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	LogixPro PLC Lab Manual for Programmable Logic Controllers	Frank D. Petruzella, McGraw Hill; 5th edition (16 February 2016)	9781259680847
2.	Collection of Exercises for PLC Programming: 100 programming exercises from beginner to expert level	Tom Mejer Antonsen, Books on Demand (10 April 2024)	978-8743057802
3.	Progammable Logic Controller (Plc) Tutorial Allen-Bradley Micro800.	Stephen Philip Tubbs, Stephen Philip Tubbs, March 21, 2013.	9780981975344

E-REFERENCES:

1. https://www.youtube.com/watch?v=BLLdkd6Tb0U.
2. **http://www.digimat.in/nptel/courses/video/108105062/L20.html.**
3. **https://www.youtube.com/watch?v=MS3qJq2jvu0.**

CO VS PO MAPPING

CO	PO							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	2	3	2	2	2	3	2	3
2	2	3	3	3	2	2	2	3	3	3
3	2	3	3	3	2	2	2	3	3	3
4	2	3	3	3	2	2	2	3	3	3
5	2	3	3	3	2	2	2	3	3	3

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

WIRELESS COMMUNICATION AND NETWORKING LAB

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DPE 636			COURSE TITLE: Wireless Communication and Networking Lab				
PROGRAMME ELECTIVE: PE V							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

RATIONALE: With the rapid growth of wireless communication and networking technologies, it is essential for Diploma in ECE students to gain hands-on experience in network setup, security, and IoT applications. This lab equips students with practical skills in LAN/WLAN configuration, IP addressing, packet analysis, and IoT communication, making them industry-ready for roles in networking, embedded systems, and smart technologies. The integration of Wi-Fi, Bluetooth, Zigbee, and MQTT ensures they understand modern wireless communication and its real-world applications.

COURSE OUTCOMES: After completion of the course the students will be able to:

CO1	Identify and demonstrate the working principles of basic network devices and topologies; establish a simple wired LAN setup.
CO2	Configure wireless LANs and apply concepts of static and dynamic IP addressing in a practical networking environment.
CO3	Analyse network traffic using Wireshark and test connectivity through wireless access points.
CO4	Implement peer-to-peer and client-server communication and apply basic network security techniques using firewalls.
CO5	Demonstrate communication technologies such as Bluetooth and Zigbee and implement IoT data transmission using MQTT protocol.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**1.** Study of Network Devices (Switch, Router, Hub, Modem, Access Point) **2.**Study of Network Topologies (Bus, Star, Ring, Mesh, Hybrid) with simulation tools **3.**Establishing a Simple Wired LAN using Ethernet Cables and Switches Course Outcome: CO1 Teaching Hours: 6 hrs Marks: 20 (PE+FINAL)
2	**4.** Configuring a Wireless LAN (Wi-Fi setup and password protection) **5.** Study and Configuration of IP Addressing: Static and Dynamic (DHCP) Course Outcome: CO2 Teaching Hours: 4 hrs Marks: 20 (PE+FINAL)
3	**6.** Packet Transmission and Analysis using Wireshark **7.** Configuring and Testing a Wireless Access Point Course Outcome: CO3 Teaching Hours: 4 hrs Marks: 20 (PE+FINAL)
4	**8.** Peer-to-Peer (P2P) and Client-Server Communication Setup (using file sharing or socket tools) **9.** Setting Up a Basic Network Firewall and Demonstrating Security Measures Course Outcome: CO4 Teaching Hours: 4 hrs Marks: 20 (PE+FINAL)
5	**10.** Study of Bluetooth and Zigbee Communication (using modules or simulators) **11.** Implementing IoT Communication using Wi-Fi and MQTT Protocol (using ESP32/Node MCU) Course Outcome: CO5 Teaching Hours: 4 hrs Marks: 20 (PE+FINAL)

REFERENCE BOOKS:

S.N.	Title	Author, Publisher, Edition, Year	ISBN
1	Data Communications and Networking	Behrouz A. Forouzan, McGraw-Hill, 5th Edition, 2017	978-1259064753
2	Computer Networking: A Top-Down Approach	James F. Kurose, Keith W. Ross, Pearson, 7th Edition, 2017	978-0133594140
3	Wireless Communications & Networks	William Stallings, Pearson, 2nd Edition, 2004	978-0131918351

E-REFERENCES:

1. https://nptel.ac.in/courses/106/105/106105081/
2. https://www.netacad.com/
3. https://www.wireshark.org/docs/
4. https://ieeexplore.ieee.org/Xplore/home.jsp
5. https://www.rfc-editor.org/

CO VS PO MAPPING

CO	PO							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	2	2	0	2	1	3	3	2
2	3	2	2	3	0	1	1	3	3	3
3	3	3	2	3	0	2	1	3	3	3
4	3	2	2	2	2	3	1	3	3	3
5	3	2	2	3	2	2	2	3	3	3