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

BIRLA INSTITUTE OF TECHNOLOGY MESRA
UNIVERSITY POLYTECHNIC

UNIVERSITY POLYTECHNIC

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

INSTITUTE VISION

To emerge as a leading technical training institution in the country and serve the nation and engineering profession with distinction by developing the most skilled human resources with comprehensive and modern training and skill-sets in selected engineering disciplines and trades.

INSTITUTE MISSION

1. To administer a technical training institute of highest standard of education and training commensurate with modern engineering practices.
2. To offer technical diploma and certificate courses to cater to contemporary demand and relevance to the engineering industry.
3. To adopt and implement modern curriculum of technical education and training.
4. To continuously upgrade the infrastructure necessary for practical training with new and contemporary machines and methods.
5. To arrange on job training and internships for the students and staff members with proper supervision.
6. To liaise with industry for internship and collaboration, and also, for arranging periodic review of infrastructure and training methods and modernizing teaching and training curriculum.
7. To create special program for the youth of the State of Jharkhand to help them acquire entrepreneurial and managerial skills, manufacturing capability, career advancement training and professional confidence.

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

DEPARTMENT VISION

To strive towards the development of the skilled human resources with comprehensive and modern technical skill-sets in the field of Electronics and Communication Engineering while adhering to Universal Human Values to serve the nation and engineering profession with distinction.

DEPARTMENT MISSION

1. To offer quality technical education and skill development in the field of electronics and communication engineering.
2. To nurture students' problem-solving abilities and familiarize them with the most recent advancements within the Electronics & Communication discipline.
3. To promote interactions between industry and the institute to enhance students' employability and readiness for the workforce.
4. To encourage faculty engagement in Faculty Development Programs focused on upcoming technologies within Electronics and Communication and to additionally, coordinate a range of technical activities, including electronic circuitry, simulation software, and troubleshooting, for students and staff under the department's appropriate supervision.
5. To facilitate partnerships with industry for internships and collaborations, and update the teaching and training curriculum within the field of Electronics and Communication Engineering, emphasizing the department's key strengths.
6. To develop a distinctive program that enables students to gain entrepreneurial and managerial proficiencies in the Electronics and Communication industry. This initiative is intended to merge with Universal Human Values to instil ethical values in students, thus fostering a commitment to serving the nation and the profession.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The program in Electronics and Communication Engineering will prepare students:

PEO1: To develop expertise amongst students to understand and solve real-life problems related to Electronics and Communication Engineering by applying the knowledge acquired.

PEO2: To adapt to state-of-the-art Electronics and Communication Engineering technologies to work in multidisciplinary environments.

PEO3: To respond to the growing and changing needs of industries and academics through continuous learning of modern technologies in Electronics and Communication.

PEO4: To inculcate an attitude to work efficiently in a team with professional ethics and universal human values.

(A) PROGRAM OUTCOMES (POs)

Diploma holders of the Electronics & Communication Engineering Program will be able to:

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and Electronics and Communication engineering to solve the engineering problems.
2. **Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.
3. **Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
4. **Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate techniques to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability, and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.

6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

7. **Life-long learning:** Ability to analyse individual needs and engage in updating in the context of technological changes.

(B) PROGRAM SPECIFIC OUTCOMES (PSOs)

1. Apply the knowledge acquired in basic sciences and engineering to solve electronics and communication engineering problems.

2. To develop proficiency in the installation, troubleshooting, and maintenance of electronic equipment and appliances.

3. To develop advanced skills in various domains of Electronics and Communication Engineering.

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

CBCS Course Structure
Total credit suggested in BOS: 125 Credit

1ST Semester (Diploma)

S. N.	COURSE CODE	COURSE TITLE	SEGMENT	L	T	P	LECTURE HOUR	CREDIT
1	DBS 101	Engineering Chemistry	BS	3	1		4	4
2	DBS 103	Applied Physics-I	BS	2	1		3	3
3	DBS 105	Mathematics-I	BS	3	1		4	4
4	DES 101	Introduction to IT Systems	ES	2	1		3	3
5	DBS 104/	Applied Physics Lab	BS			2	2	1
6	DHS 103	Communication Skills	HS	3	0	0	3	3
7	DHS 102/104/106	Sports and Yoga/NSS/NCC	HS			2	2	1
8	DES 102	Engineering Graphics	ES			4	4	2
9	DES 104	Engineering Workshop Practice	ES			2	2	1
		Periods per week		13	4	10	**27**	
		Total credits						**22**
		Total periods per week						**27**

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING
2nd Semester (Diploma)

S. N.	COURSE CODE	COURSE TITLE	SEGMENT	L	T	P	LECTURE HOUR	CREDIT
1	DBS 201	Applied Physics-II	BS	2	1		3	3
2	DBS 203	Mathematics-II	BS	3	1		4	4
3	DES 205	Fundamentals of Electrical & Electronics Engineering	ES	3			3	3
4	DES 203	Engineering Mechanics	ES	3			3	3
5	DAU 201	Environmental Sciences	AUDIT	2			2	0
6	DBS 202	Applied Chemistry Lab	BS			2	2	1
7	DES 202	Fundamentals of Electrical & Electronics Engineering Lab	ES			2	2	1
8	DES 204	Engineering Mechanics Lab	ES			2	2	1
9	DES 206	Introduction To IT Systems Lab	ES			2	2	1
10	DHS 202/204/206	Sports and Yoga/NSS/NCC	HS			2	2	1
		Periods per week		13	2	10	**25**	
		Total credits						**18**
		Total periods per week						**25**

UNIVERSITY POLYTECHNIC
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DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

NEW COURSE STRUCTURE – To be effective for Diploma 2023-24 [2nd Year Onwards]
Based on CBCS system & OBE model
Recommended scheme of study
(For Diploma in Electronics & Communication Engineering)

Semester of Study (Recommended)	Category of course	Course Code	Subjects	Mode of delivery & credits *L-Lecture; T-Tutorial; P-Practical*			Total Credits *C- Credit*
				L	**T**	**P**	**C**
THEORY							
THIRD	PC	**DEC 301**	**Basic Electronics**	**3**	**0**	**0**	**3**
		DEC 303	Digital Electronics	3	0	0	3
		DEC 305	Electronic Measurements and Instrumentation	3	0	0	3
		DEC 307	Electric Circuits and Network	3	0	0	3
		DCE 301	Computer Programming	3	0	0	3
	Mandatory Course	DHS 301	**Universal Human Values-II**	2	1	0	**3**
	SESSIONAL						
	PC	DEC 302	Basic Electronics Lab	0	0	2	1
		DEC 304	Digital Electronics Lab	0	0	2	1
		DEC 306	Electronic Measurements and Instrumentation Lab	0	0	2	1
		DCE 302	Computer Programming Lab	0	0	2	1
	Summer Internship	DSI 331	**Summer Internship-I (4 weeks) after II Semester**	0	0	0	**Non-Credit**
TOTAL CREDITS							**22**
Total Lectures Per Week						**26**	
THEORY							
FOURTH	PC	DEC 401	Analog Communication	3	0	0	3
		DEC 403	**Microprocessor and Microcontroller**	**3**	**0**	**0**	**3**
		DEC 405	IC Technology	3	0	0	3
	PE	DPE 431/432/433	PE-I	3	0	0	3
	OE	DOE 431/432/433	OE-I [Courses from other Branches]	3	0	0	3
	SESSIONAL						
	PC	DEC 402	Analog Communication Lab	0	0	2	1
		DEC 404	Microprocessor and Microcontroller Lab	0	0	2	1
	Project	DPR 431	Minor Project	0	0	4	2
	Mandatory Course	DAU 401	Essence of Indian Knowledge and Tradition	2	0	0	0 (Non-credit)
TOTAL CREDITS							**19**
Total Lectures Per Week						**26**	
GRAND TOTAL FOR SECOND YEAR							**41**

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 & Communication 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 531/532/533/534	PE-II	3	0	0	3
		DPE 535/536/537	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	Wireless and Mobile 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	Seminar	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
PE-II							
SEM- V	DPE 531	Industrial Automation	Electronic Measurements and Instrumentation	3	0	0	3
	DPE 532	Control System	Electronic Measurements and Instrumentation	3	0	0	3
	DPE 533	Signals and Systems	Electric Circuits and Network	3	0	0	3
	DPE 534	Introduction to IOT	Microprocessor and Microcontroller	3	0	0	3
PE-III							
SEM-V	DPE 535	Microwave and RADAR	Analog Communication	3	0	0	3
	DPE 536	Optical Communication and Networking	Analog Communication	3	0	0	3
	DPE 537	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

BASIC ELECTRONICS

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 301			COURSE TITLE: Basic Electronics				
COMPULSORY : 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 the students to:

1 Draw and describe the basic circuits of rectifier and filters.
2 Understand transistor operation, configuration, stability and biasing techniques.
3 Relate the frequency response of BJT amplifier and identify the various types of transistor amplifiers.
4 Understand feedback concepts and operation of oscillators.
5 Basic understanding of FET and MOSFET operation and characteristics.

COURSE OUTCOMES: At the end of the course the students will be able to:

CO1	Interpret and recognize the applications of rectifier and filter circuits.
CO2	Demonstrate transistor operation, configuration, stability and biasing techniques.
CO3	Recognise and implement various types transistor amplifiers.
CO4	Comprehend the principles of feedback circuits and the functioning of oscillators.
CO5	Familiarize with the fundamentals of FET and MOSFET functioning and properties.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Rectifier and Filter Circuits** 1.1 Diode as half wave, full wave and bridge rectifier. 1.2 DC Output Voltage and Current of rectifiers. 1.3 PIV, rectification efficiencies and ripple factor calculations. 1.4 Shunt capacitor filter, series inductor filter. 1.5 LC filter and RC filter. Course Outcome: CO1 Teaching Hours: 6 hrs Marks: 31 (PE+FINAL)
2	**Fundamentals of Transistors** 2.1 CB, CE, CC configuration of the transistor; 2.2 Input and output characteristics in CB and CE configurations; 2.3 Current amplification factors. 2.4 D.C load line and selection of operating point. 2.5 Need for stabilization of operating point. 2.6 Different types of biasing circuits. Course Outcome: CO2 Teaching Hours: 10 hrs Marks: 21 (PE+FINAL)
3	**Small Signal Analysis and Types of BJT Amplifiers** 3.1 Hybrid -π Model for Two-Port Network Analysis 3.2 Small signal analysis of BJTs at low frequencies.

	3.3 Single and Multistage Amplifiers 3.4 Transistor Power Amplifiers 3.5 Tuned Transistor Voltage Amplifiers Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)
4	**Feedback Amplifier and Oscillator Circuits** 4.1 Basic principles and types of feedback. 4.2 Derivation of expression for gain of an amplifier employing feedback, Effect of feedback (negative) on gain, stability, distortion and bandwidth of an amplifier. 4.3 RC coupled amplifier with emitter bypass capacitor, Emitter follower amplifier and its application 4.4 Barkhausen criterion for oscillations, 4.5 Different oscillator circuits (working principles)-tuned collector, Hartley, Colpitts, phase shift, Wien's bridge, and crystal oscillator. Course Outcome: CO4 Teaching Hours: 10 hrs Marks: 21 (PE+FINAL)
5	**Field Effect Transistors** 5.1 Construction, operation and characteristics of FET and its application. 5.2 Construction, operation and characteristics of MOSFET in depletion and enhancement modes and their applications. 5.3 CMOS - advantages and applications. 5.4 Comparison of JFET, MOSFET and BJT 5.5 FET amplifier circuit and its working principle. (No analysis). Course Outcome: CO5 Teaching Hours: 6 hrs Marks: 11 (PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electronic Principles	Albert Paul Malvino; McGraw Hill Inc., USA; 6th Edition @	978- 0028028385
2.	Basic Electronics	J.B. Gupta, Ms/. S. K. Kataria & Sons, Third Edition, Reprint @2022	978-8190691949
3.	Basic Electronics and Linear Circuit	NN Bhargava and Kulshreshta, Tata McGraw Hill Education, Europe.	978-0074519653

E-REFERENCES:

https://archive.nptel.ac.in/courses/117/103/117103063/

CO VS PO MAPPING

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

UNIVERSITY POLYTECHNIC
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DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

DIGITAL ELECTRONICS

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 303			COURSE TITLE: Digital Electronics				
COMPULSORY : Core							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: Students are expected to:

1. Know the fundamental principles of Digital circuits.
2. Familiar with available IC chips and simplify logic functions.
3. Understand the operation of flip-flops.
4. Identify and understand the operation of registers and counters.
5. Describe working of multivibrators and simple linear wave shaping techniques.

Course Outcomes: After the completion of the course students will be able to:

CO1	Understand the fundamental principles of Digital circuits.
CO2	Identify available IC chips and simplify logic functions.
CO3	Demonstrate the applications and circuits of flip-flops.
CO4	Demonstrate the applications and circuits of registers and counters.
CO5	Understand and apply multivibrators and linear wave shaping techniques in digital circuits.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Fundamentals:** 1.1 Binary numbers, Octal and Hexadecimal numbers, Conversion from one number system to another 1.2 BCD numbers, Binary arithmetic, floating point number system, Binary codes, 1.3 Boolean Algebra, Boolean Theorems, De-Morgan's Theorem, Duality Theorems 1.4 Minimization using Boolean Algebra / Boolean Theorems 1.5 Positive, Negative and mixed logic, Basic logic gates, Universal gates, Special gates 1.6 Implementation of gates using NAND and NOR gates. Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 31 (PE+FINAL)
2	**Simplification of Boolean Function:** 2.1 SOP and POS Form, Standard SOP and POS Form 2.2 Converting Expression in Standard SOP or POS Form, Minterms and Maxterms, Karnaugh Map (K-map) method of minimization of functions. **Combinational Logic Circuits:** 2.3 Half adder, Full adder circuit, Subtractor; design and Implementation 2.4 Encoder, Decoders, Parity Generators/Checkers. 2.5 Multiplexers, Demultiplexers: Design and Implementation Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)

3	**Flip-Flops:** 3.1 Concept and types of latches with their working and applications, Operation using waveforms and truth tables of SR flip-flop -Clocked and Unclocked, 3.2 D-flip-flop, T-flip-flop, J-K flip-flop, 3.3 Excitation Table of SR flip-flop, JK flip-flop 3.4 Race around condition, Master- Slave JK flip-flops 3.5 Difference between a latch and a flip flop, Realization of one flip-flop using other Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)
4	**Registers:** 4.1 Basic concepts including shift left and shift right, Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out. 4.2 Bi-directional Storage Register, Universal shift register, Buffer register, Tristate Buffer register , IC 7495. **Counters:** 4.3 Introduction to Asynchronous and Synchronous counters, Binary counters, Divide by N ripple counters, Decade counter, Up/down counter, Ring counter with timing diagram, Counter ICs and Memories. Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
5	**Multivibrators:** 5.1 Introduction to Multivibrator, Transistor based Multivibrators, Working principle and applications of Astable multivibrator 5.2 Bistable & Monostable multivibrator **Linear wave Shaping:** 5.3 Series and Parallel diode clipping circuit, clamping a waveform to zero level Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 11 (PE+FINAL)

TEXT & REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Digital Design **(T)**	M. Morris Mano, 4th Edition, Prentice Hall of India Pvt. Ltd., 2008.	9788131714508
2.	Digital Electronics (Circuits, Systems & Ics) (**R**)	by S. N. Ali, Galgotia	9788175153608
3.	Digital Principles and Applications (**T**)	Donald P.Leach and Albert Paul Malvino, 6th Edition, TMH,2006.	0070601755
4.	Digital Fundamentals (**R**)	Thomas L. Floyd, 10th Edition, Pearson Education Inc, 2011.	**10**: 0132359235 **I** 13: 9780132359238

E-REFERENCES:

1. NPTEL ::Electrical Engineering - NOC: Digital Electronic Circuits

CO VS PO MAPPING

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

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

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 305			COURSE TITLE: Electronic Measurements and Instrumentation				
COMPULSORY : Core							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

Rationale: Students are expected to:

1. Understand the elements of Instruments and measurement systems and interpret the performance characteristics of the measurement.
2. Explain the working of Electronic Instruments: Digital Instrument, Digital Voltmeter. Digital Multimeter, X-Y Recorders, Plotters, Function Generators, Digital Spectrum Analyzer.
3. Evaluate the measurements performed by oscilloscopes after inferring the needs of display devices and oscilloscopes in the instrumentation.
4. Analyse transducers for the measurement of given physical variables.
5. Analyse the Data Acquisition system (DAS).

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

CO1	Exemplify the elements of Instruments and measurement systems and interpret the performance characteristics of the measurement.
CO2	Analyse the working of Digital Instruments, Digital Voltmeter. Digital Multimeter, X-Y Recorders, Plotters, Function Generators, Digital Spectrum Analyzer.
CO3	Recognise the needs of display devices and oscilloscopes in the instrumentation; evaluate the measurements performed by oscilloscopes.
CO4	Differentiate transducers for the measurement of different physical variables.
CO5	explain Sampling theorem and its importance, signal transmission

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Measurement Systems** 1.1 Measurement, Methods of Measurement, Measurement System 1.2 Applications of Measurement System 1.3 Elements of Generalized Measurement System 1.4 Performance Characteristics: Static and Dynamic 1.5 Error, types of error Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 31 (PE+FINAL)
2	**Miscellaneous Electronic Instruments:** 2.1 Digital Instruments, digital voltmeters, 2.2 Digital multimeter, digital frequency meter, 2.3 PMMC Instruments 2.4 X-Y recorder, plotters 2.5 Function Generators 2.6 Digital Spectrum Analyzers Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
3	**Display Devices and Oscilloscopes** 3.1 Display Devices: Introduction 3.2 LED, LCD 3.3 CRO Introduction, CRT 3.4 Voltage and Frequency Measurement using CRO

	3.5 Digital Storage Oscilloscopes Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)
4	**Transducers**: 4.1 Classification of Transducers, Factors Affecting the selection of transducers 4.2 Principles of Resistive, Inductive and capacitive transducer, 4.3 LVDT, Strain gauge, Gauge Factor 4.4 Thermocouple, Thermistor, RTD, 4.5 Piezoelectric, optoelectronic (Photoelectric) transducers Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
5	**Data Acquisition System (DAS):** 5.1 Analog signal processing, sample and hold operation, S/H circuits using OP-Amps 5.2 Instrumentation amplifier, isolation amplifier 5.3 Analog to digital converter, Digital to Analog Converter 5.4 Introduction to Data Acquisition System (DAS) Components of Digital & Analog DAS 5.5 Data Logger Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 11 (PE+FINAL)

TEXT & REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electrical & Electronic Measurements & Instrumentations **(T)**	A.K. Sawhney, Dhanpat Rai & Co. (P) Limited (1 January 2015)	978-8177001006
2.	Electronic Instrumentation and Measurements **(R)**	H S Kalsi, McGraw-Hill; Forth edition (25 March 2019)	978-0-470-82353-8
3.	Electronic Instrumentation & Measurement	David A Bell, Oxford University Press (12 April, 2013)	978-0195696141

E-REFERENCES:

https://onlinecourses.nptel.ac.in/noc23_ee112/

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	1	1	2	1	1	1	2	3	3	1
2	1	2	2	1	1	1	2	2	2	2
3	1	2	3	2	1	1	2	3	3	3
4	2	2	2	2	1	1	2	2	1	2
5	3	3	3	3	1	1	2	2	2	3

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

ELECTRIC CIRCUITS AND NETWORK

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 307			COURSE TITLE: Electric Circuits and Network				
COMPULSORY : 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 the students to

1. To build and test electrical and electronic circuits.
2. To develop the skills to diagnose and rectify the electric network and circuit.
3. Solve problems related to time domain and frequency domain analysis.
4. Discuss the concepts of graph theory.
5. Illustrate and outline the two-port networks in engineering.

COURSE OUTCOMES: At the end of the course the students will be able to:

CO1	Interpret Electrical and Magnetic circuits well and develop analogy between electric and magnetic circuits.
CO2	Demonstrate topological properties of electrical networks using basic circuit theory concepts.
CO3	Translate the time domain circuit analysis to the frequency domain analysis.
CO4	Identify implications of Fourier Series and Fourier Transform in Electrical Circuits and Networks.
CO5	Determine the response of circuits using two-port networks.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Electric and Magnetic Circuits** 1.1 EMF, Current, Potential Difference, Power and Energy 1.2 M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve 1.3 Electromagnetic induction, Faraday's laws of electromagnetic induction 1.4 Lenz's law; Dynamically induced emf; Statically induced emf 1.5 Equations of self and mutual inductance, Dot Convention, Coefficient of Coupling, Analogy between electric and magnetic circuits Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 31 (PE+FINAL)
2	**Graph Theory** 2.1 Introduction, Planar and Non-Planar Graphs 2.2 Tree and Co-Tree, Twigs and Links 2.3 Incidence Matrix, Properties of Incidence Matrix 2.4 Incidence Matrix and KCL, Link Currents, Tie-Set Matrix, Tie-Set Matrix and Branch Currents 2.5 Cut-Set and Tree Branch Voltages, Cut-Set Orientation, Cut-Set Matrix and KCL for Cut-Sets Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)

3	**Time Domain and Frequency Domain Analysis** 3.1 Introduction to first and second order differential equations for Series and parallel R-L-C circuits 3.2 Initial and Final conditions in network elements 3.3 Forced and Free response, time constants 3.4 Steady State and Transient State Response 3.5 Analysis of electrical circuits using Laplace Transform for standard inputs (unit, Ramp, Step) Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)
4	**Fourier Series and Transforms** 4.1 Discrete spectra and symmetry of waveform 4.2 Steady state response of a network to non-sinusoidal periodic inputs 4.3 Fourier transform and continuous spectra 4.4 Practice problems on Fourier Series and Fourier Transform Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
5	**Two Port Network** 5.1 Two Port Network, Open Circuit Impedance (Z) Parameters 5.2 Short Circuit Admittance (Y) Parameters 5.3 Transmission (ABCD) Parameters, Inverse Transmission Parameters 5.4 Hybrid (h) Parameters, Inverse Hybrid Parameters 5.5 Interrelationship of Two Port Network Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 11 (PE+FINAL)

TEXT AND REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Networks and Systems	Ashfaq Husain, Khanna Book Publishing Co. (P) Ltd., Second Edition, 2019	978-8187522089
2.	Engineering Circuit Analysis	W. H. Hayt, J. E. Kemmerly and S. M. Durbin, McGraw Hill Education; Eighth Edition, 2013	978-1259098635
3.	Circuits and Networks Analysis and Synthesis	A. Sudhakar, Shyammohan S. Palli, McGraw Hill Education, Fifth Edition, 2017	978-9339219604

E-REFERENCES:

1. www. nptelvideos.in/electrical engineering/circuit theory

CO VS PO MAPPING

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

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

Universal Human Values-II

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DHS 301			COURSE TITLE: Universal Human Values-II				
COMPULSORY: Mandatory Course							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
2	1	0	3	3	50	50	100

RATIONALE: The objective of the course is fourfold:
1.Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

COURSE OUTCOMES: At the end of the course, the students are expected to:

CO1	Be more aware of themselves, and their surroundings (family, society, nature).
CO2	Become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
CO3	Have better critical ability.
CO4	Become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
CO5	Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction - Need, Basic Guidelines, Content and Process for Value Education** **Lecture 1:** Purpose and motivation for the course, recapitulation from Universal Human Values-I **Lecture 2:** Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration **Lecture 3:** Continuous Happiness and Prosperity- A look at basic Human Aspirations **Lecture 4:** Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority **Lecture 5:** Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario **Lecture 6:** Method to fulfil the above human aspirations: understanding and living in harmony at various levels. **Practice Session 1** Discuss natural acceptance in human being as the innate acceptance **Practice Session 2** Arbitrariness in choice based on liking-disliking **Practice Session 3** Natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) Course Outcome: CO1 Teaching Hours: 9 hrs Marks: 20 (PE+FINAL)
2	**Module 2 – Understanding Harmony in the Human Being - Harmony in Myself!** **Lecture 7:** Understanding human being as a co-existence of the sentient 'I' and the material 'Body' **Lecture 8:** Understanding the needs of Self ('I') and 'Body' - happiness and physical facility **Lecture 9:** Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) **Lecture 10:** Understanding the characteristics and activities of 'I' and harmony in 'I'

	Lecture 11: Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail **Lecture 12:** Programs to ensure Sanyam and Health. **Practice Session 4** Discuss the role others have played in making material goods available to me. **Practice Session 5** Differentiate between prosperity and accumulation. **Practice Session 6** Discuss program for ensuring health vs dealing with disease. Course Outcome: CO2 Teaching Hours: 9 hrs Marks: 20 (PE+FINAL)
3	**Module 3 – Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship** **Lecture 13:** Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship **Lecture 14:** Understanding the meaning of Trust; Difference between intention and competence **Lecture 15:** Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship **Lecture 16:** Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals **Lecture 17:** Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. **Practice Session 7** Reflect on relationships in family, hostel and institute as extended family, Teacher-student relationship with real life examples **Practice Session 8** Goal of education. **Practice Session 9** Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives Course Outcome: CO1 , CO2, CO3,CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
4	**Module 4 – Understanding Harmony in the Nature and Existence - Whole existence as Coexistence** **Lecture 18:** Understanding the harmony in the Nature **Lecture 19:** Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature **Lecture 20:** Understanding Existence as Co-existence of mutually interacting units in all pervasive space **Lecture 21:** Holistic perception of harmony at all levels of existence. **Practice Session 10** Discuss human being as cause of imbalance in nature, pollution. **Practice Session 11** Discuss human being as cause of depletion of resources **Practice Session 12** Discuss the role of technology Course Outcome: CO1 , CO2, CO3, CO4 Teaching Hours: 7 hrs Marks: 20 (PE+FINAL)
5	**Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics** **Lecture22:** Natural acceptance of human values **Lecture 23:** Definitiveness of Ethical Human Conduct **Lecture 24:** Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order **Lecture 25:** Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. **Lecture 26:** Case studies of typical holistic technologies, management models and production systems **Lecture 27:** Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations **Lecture 28:** Sum up. **Practice Session 13** Exercises to discuss the conduct as an engineer or scientist. **Practice Session 14** Case Studies to discuss the conduct as an engineer or scientist. Course Outcome: CO1 , CO2, CO3,CO4, CO5 Teaching Hours: 9 hrs Marks: 20 (PE+FINAL)

TEXT BOOK:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	*A Foundation Course in Human Values and Professional Ethics*	R R Gaur, R Asthana, G P Bagaria, 3rd Revised Edition, UHV Publications, New Delhi, 2023	**ISBN:** 978-81-957703-7-3 (Printed Copy)

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

E-REFERENCES:

1. *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G P Bagaria, 3rd Revised Edition, UHV Publications, New Delhi, 2023; **ISBN:** 978-81-957703-6-6 (e-book)

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

BASIC ELECTRONICS LAB

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 302			COURSE TITLE: Basic Electronics Lab.				
COMPULSORY / OPTIONAL: Core							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

RATIONALE: Basic Electronics laboratory course is indispensable for ECE students as it provides them with practical skills, enhances their understanding of theoretical concepts, prepares them for the industry, fosters creativity, and lays the foundation for further studies and research in the field of Electronics and Communication Engineering.

COURSE OUTCOMES

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

CO1	Understand the circuits of half wave rectifier & effect of the use of filter.
CO2	Understand the circuits of full wave rectifier & effect of the use of filter in rectifiers.
CO3	Demonstrate the applications and circuits of passive filters and CE transistors.
CO4	Demonstrate the applications and circuits of CB & CC transistors.
CO5	Understand BJT and FET amplifier circuit characteristics and applications.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	Measurement of Frequency and voltage using CRO. Course Outcome: CO1 Teaching Hours: 2 hrs
2	Half-Wave Rectifier Circuit Without and with C- Filter. Course Outcome: CO1 Teaching Hours: 2 hrs
3	Full-Wave Centre-tap Rectifier Circuit Without and with C-Filter. Course Outcome: CO2 Teaching Hours: 2 hrs
4	Full-Wave Bridge Rectifier Circuit Without and with C-Filter. Course Outcome: CO2 Teaching Hours: 2 hrs
5	RC circuit as a filtering network. Course Outcome: CO3 Teaching Hours: 2 hrs
6	Study and Identification of transistors using multimeter. Course Outcome: CO3 Teaching Hours: 2 hrs
7	Input and output characteristics and calculate parameters of transistors in CE configuration. Course Outcome: CO3 Teaching Hours: 2 hrs
8	Input and output characteristics and calculate parameters of transistors in CB configuration. Course Outcome: CO4 Teaching Hours: 2 hrs
9	To study the emitter follower circuit. Course Outcome: CO4 Teaching Hours: 2 hrs
10	Measurement of Voltage Gain, input, output impedance in single state CE amplifier circuit. Course Outcome: CO5 Teaching Hours: 2 hrs
11	V-I characteristics of FET amplifier. Course Outcome: CO5 Teaching Hours: 2 hrs

TEXT AND REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electronic Principles	Albert Paul Malvino; McGraw Hill Inc., USA; 6th Edition @	978- 0028028385
2.	Basic Electronics	J.B. Gupta, Ms/. S. K. Kataria & Sons, Third Edition, Reprint @2022	978-8190691949
3.	Basic Electronics and Linear Circuit	NN Bhargava and Kulshreshta, Tata McGraw Hill Education, Europe.	978-0074519653

E-REFERENCES:

1. http://acl.digimat.in/nptel/courses/video/122106025/L01.html
2. http://www.digimat.in/nptel/courses/video/122106025/L07.html

CO VS PO MAPPING

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

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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

DIGITAL ELECTRONICS LAB

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 304			COURSE TITLE: Digital Electronics Lab				
COMPULSORY / OPTIONAL: Core							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

RATIONALE: This course enables the students to:

1. Identify and construct basic and universal gates using ICs.
2. Design and implementation of code converters using logic gates.
3. Implementing verification circuits for De-Morgan's theorem.
4. Design and implementation of SR Flip-flop and Adder circuits.
5. Design and realization of parity bit checker & generator.

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

CO1	Understand the pin layouts & use of basic and universal gates using ICs.
CO2	Demonstrate and implement code converters using logic gates.
CO3	Demonstrate the applications De-Morgan's theorem.
CO4	Demonstrate and implement SR Flip-flop and Adder circuits.
CO5	Demonstrate and implement parity bit checker & generator.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	1. Verification of basic Logic gates. 2. Verification of Universal logic gates and realization of basic gates Course Outcome: CO1 Teaching Hours: 4 hrs
2	2.1 Design and implementation of BCD to excess-3 code and vice versa code converters using logic gates. 2.2 Design and implementation of Binary to Gray and vice versa code converters using logic gates. Course Outcome: CO2 Teaching Hours: 4 hrs
3	3.1 Prove DE – Morgan's 1st theorem. 3.2 Prove DE – Morgan's 2nd theorem. Course Outcome: CO3 Teaching Hours: 4 hrs
4	4.1 Design and realization of S.R. flip-flop using IC 7400. 4.2 Construction of Half Adder and Full Adder. Course Outcome: CO4 Teaching Hours: 4 hrs
5	5.1 Design and realization of a parity bit checker using IC 7486. 5.2 Design and realization of parity bit generator using IC 7486. Course Outcome: CO5 Teaching Hours: 4 hrs

TEXT & REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Digital Design **(T)**	M. Morris Mano, 4th Edition, Prentice Hall of India Pvt. Ltd., 2008.	9788131714508
2.	Digital Electronics (Circuits, Systems & Ics) (**R**)	by S. N. Ali, Galgotia	9788175153608
3.	Digital Principles and Applications (**T**)	Donald P.Leach and Albert Paul Malvino, 6th Edition, TMH,2006.	0070601755
4.	Digital Fundamentals (**R**)	Thomas L. Floyd, 10th Edition, Pearson Education Inc, 2011.	10: 0132359235 **I** 13: 9780132359238

E-REFERENCES:

1. NPTEL ::Electrical Engineering - NOC: Digital Electronic Circuits

CO VS PO MAPPING

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

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

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION LAB

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 306			COURSE TITLE: Electronic Measurements and Instrumentation Lab				
COMPULSORY / OPTIONAL: Core							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

RATIONALE: Students are expected to:

1. Understand the basics of CRO and Function Generator with the demonstration of their Front Panel Controls.
2. Apply Function Generator, CRO, and Digital Multimeter for different measurements.
3. Analyse the working of the analog-to-digital converter and digital-to-analog converter.
4. Understand the Front panel control of the Digital Storage Oscilloscope and operate it for observations of basic measurements.
5. Apply transducers for the measurement of different physical variables.

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

CO1	Interpreting the basics of CRO and Function Generator with the demonstration of their Front Panel Controls.
CO2	Execute measurements using a Function Generator, CRO, and Digital Multimeter.
CO3	Differentiating the working of Analog to Digital Converter and Digital to Analog Converter
CO4	Interpret the Front panel control of the Digital Storage Oscilloscope and operate it for observations of basic measurements.
CO5	Execute measurement of different physical variables using a transducer.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE: Basics of CRO and Function Generator** 1.1. To study the front panel control of CRO. 1.2 To study the front panel control of the function generator. Course Outcome: CO1 Teaching Hours: 4 hrs
2	**TITLE: Measurements performed through CRO and Digital Multimeter** 2.1 Voltage and Frequency Measurement using CRO 2.2 To study the applications of the Digital Multimeter Course Outcome: CO2 Teaching Hours: 4 hrs
3	**TITLE: Interfacing of Real-world Signals with Digital Instruments** 3.1 To study and observe the output of a 4-bit digital-to-analog converter. 3.2 To study and observe the output of an 8-bit analog-to-digital converter. Course Outcome: CO3 Teaching Hours: 4 hrs
4	**TITLE: Digital Multimeter and Sensor** 4.1 Different Use Cases of Digital Multimeter: Voltage, Current and Resistance Measurement. 4.2 To observe the output Characteristic of IC temperature sensor (LM335). Course Outcome: CO4 Teaching Hours: 4 hrs
4	**TITLE: Digital Storage Oscilloscope** 4.1 Infer the front panel function overview of the Digital Storage Oscilloscope. 4.2 Attribute voltage of the measured signal on the user interface.

	Course Outcome: CO5 Teaching Hours: 4 hrs
5	**TITLE: Transducers** a. To observe the output Characteristic of Linear Variable Differential Transformer (LVDT). b. To Check the output of Load measurement using a Strain Gauge.

TEXT & 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 (1 January 2015)	**978-8177001006**
2.	Quick Guide DS1000Z Series Digital Oscilloscope	-	-
3.	Scientech CRO manual	-	-
4.	D/A and A/D Converter Training Kit Manual	-	-
5.	Electronic Instrumentation and Measurements	H S Kalsi, McGraw-Hill; Forth edition (25 March 2019)	978-9353162511

E-REFERENCES:

https://onlinecourses.nptel.ac.in/noc23_ee112/

https://youtube.com/playlist?list=PLbRMhDVUMngcoKrA4sH-zvbNVSE6IpEio&si=QbS5tZEZqVgYn46T

CO VS PO MAPPING

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

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

ANALOG COMMUNICATION

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DEC 401			COURSE TITLE: Analog Communication				
COMPULSORY / OPTIONAL: Core							
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 to basics of signals, needs of modulation and multiplexing techniques.
2.	Know the noise, types of noise and significance of noise equivalent band width.
3.	Understand the different methods of modulation and demodulation of AM and DSB-SC signal.
4.	Explain the methods of generation of SSB, VSB and their demodulation along with advantages and disadvantages.
5.	Understand angle modulation, modulation and demodulation methods of FM, PM wave, concept of pre-emphasis and de-emphasis.

Course Outcomes: After the completion of this course, students will be able to

1.	Demonstrate an understanding on communication system and representation of signals.
2.	Explain the types of noise and significance of noise equivalent band width.
3.	Explain the different methods of amplitude modulation and demodulation schemes, their design, operation and applications.
4.	Demonstrate an understanding on different methods of SSB, VSB, their design, operation and applications.
5.	Explain the concept of AM, FM & PM, their design, operation, comparison and applications.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	***Communication Of Signals And Transmission Media:*** 1.1 The communication process, sources of Information, Message and signals, classification of signals 1.2 Elements of a communication system 1.3 Modulation, needs of modulation 1.4 Radio frequency spectrum, Types of transmission Media, Transmission Multiplexing schemes. Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 31 (PE+FINAL)
2	***Noise and Their Classification*:** 2.1 Classification and origin of noise, thermal noise, white noise, shot noise 2.2 Noise equivalent bandwidth, noise temperature 2.3 Signal in presence of noise, signal to noise ratio (SNR)

	2.4 Noise figure, noise temperature Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
3	***AM Transmitter and Receivers:*** 4.1 Generation of AM wave, low level and high level modulation 4.2 AM transmitter block diagram 4.3 Modulation and Demodulation of AM Waves. 4.4 DSB-SC modulation, Generation of DSB-SC signals, Demodulation of DSB-SC signals. 4.5 Tuned radio frequency (TRF) receiver, Super heterodyne receiver 4.6 Sensitivity, selectivity, fidelity, tracking, image frequency and its rejection, IF amplifiers Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)
4	***SSB Transmitters and Receivers*:** 4.1 Generation of SSB: filter method, phase shift method 4.2 Demodulation of SSB: coherent detection method, advantages of SSB over DSB- FC 4.3 Vestigial sideband transmission (VSB): Generation of VSB. 4.4 Demodulation of VSB, advantages of VSB. Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
5	***FM Transmitter and Receivers:*** 5.1 Mathematical representation of frequency and phase modulation 5.2 Narrow-band FM, wideband FM, transmission BW of FM wave 5.3 Methods of generation of frequency modulated (FM) wave 5.4 Demodulation of FM waves 5.5 Pre-emphasis and de-emphasis, Comparison between AM, FM & PM. Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 11 (PE+FINAL)

TEXT & REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Communication Systems	S. Haykin, Wiley India Pvt. Ltd, 4th Edition 2001	9971513056, 9789971513054
2.	Communication Systems	R. P. Singh and S.D Sapre, Tata McGraw Hills Education Pvt. Ltd, 3rd Edition, 2012	9781259004605
3.	Analog Communication Systems	Sanjay Sharma, S.K. Kataria & Sons, 7th Edition, 2016	978-93-5014-379-7
4.	Modern Digital & Analog Communication System	B.P. Lathi, 3rd Edition, Oxford University Press, 1998	9780198073802, 0198073801
5.	Electronic Communication Systems	Kennedy & Davis, 4th Edition, McGraw Hill Education, 2011	13. 978-0071077828

E-REFERENCES:

1. Analog communication - Course (nptel.ac.in)

CO VS PO MAPPING

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

MICROPROCESSOR AND MICROCONTROLLER

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DEC 403			COURSE TITLE: Microprocessor and Microcontroller				
COMPULSORY / OPTIONAL: 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 and Compare Fundamentals of Microprocessors and Microcontrollers.
2. Illustrate the Architecture of INTEL 8086 Microprocessor.
3. Interface I/O and Peripheral Devices with 8085 Microprocessor.
4. Understand the Architecture of the Microcontroller series (MCS) – 51.

COURSE OUTCOMES

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

CO1	Compare fundamentals of Microprocessors and Microcontrollers.
CO2	Discuss the Architecture of the INTEL 8086 Microprocessor
CO3	Identify Peripheral Devices and understand the process of partitioning.
CO4	Identify the Peripheral ICs and their Interfacing with microprocessors.
CO5	Demonstrate the architecture details of Microcontroller series (MCS) – 51

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Microprocessors and Microcontrollers** 1.1 Definition of microprocessors and microcontrollers 1.2 Differences between microprocessors and microcontrollers 1.3 Evolution and history 1.4 Applications in various fields Course Outcome: CO1 Teaching Hours: 6 hrs Marks: 31 (PE+FINAL)
2	**INTEL 8086 Microprocessor** 2.1 Introduction, Architecture: Bus Interface Unit, Execution Unit 2.2 Pin-description 2.3 Operating modes: Pin–description for Minimum and Maximum mode 2.4 Operation 2.5 Registers Course Outcome: CO2 Teaching Hours: 9 hrs Marks: 21 (PE+FINAL)
3	**Peripheral Devices** 3.1 Address space partitioning – Memory mapped I/O Scheme; 3.2 Address space partitioning –I/O mapped I/O Scheme 3.3 Memory and I/O interfacing, 3.4 Data-transfer schemes 3.5 Interrupts of Intel 8086 Course Outcome: CO3 Teaching Hours: 7 hrs Marks: 16 (PE+FINAL)
4	**Peripheral Devices and their Interfacing:** 4.1 Brief Introduction to 8255

	4.2 Brief Introduction to 8253 4.3 Interfacing of 8255 with Microprocessor. 4.4 Interfacing of 8253 with Microprocessor. Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
5	**Microcontroller series (MCS) – 51 Overview:** 5.1 Architecture of 8051/8031 Microcontroller 5.2 Pin Details 5.3 Input Output Ports 5.4 Memory Organization, 5.5 Special Function Registers (SFRs) 5.6 External Memory Course Outcome: CO5 Teaching Hours: 10 hrs Marks: 11 (PE+FINAL)

TEXT AND REFERENCE Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Fundamentals of Microprocessor and Microcontrollers	B. Ram, Dhanpat Rai Publications, Seventh Edition,31 March 2018	978-8189928605
2.	The 8051 Microcontroller	Kenneth J. Ayala THOMSON, Cengage Learning, Third Edition	978-1401861582
3.	Microcontrollers (Theory and Applications)	Ajay V. Deshmukh, McGraw-Hill Education (India) Pvt Limited, 2005	978-0070585959
4.	Microcontrollers and Applications	Santanu Chattopadhyay, All India Council for Technical Education, January 2023	978-81-960576-0-2
5.	Microprocessor and Microcontroller	Saurabh Chaudhury, Risha Mal, All India Council for Technical Education, March, 2023	978-81-960576-9-5
6.	Microprocessors and Microcontrollers	Krishna Kant, PHI Learning Private Limited, Second Edition, 2012	978-81-203-3191-4

E-REFERENCES:

1. https://dokumen.pub_microprocessors-and-microcontrollers-architecture-programming-and-system-design-8085-8086-8051-8096-8120331915-9788120331914
2. https://www.google.com/search?sca_esv=595668565&sxsrf=AM9HkKl1daRHzM4OLRqH_0V6BZO_w-uAHg:1704374518334&q=vdoc.pub_microprocessors-and-microcontrollers-architecture-programming-interfacing-using-8085-8086-and-8051&nfpr=1&sa=X&ved=2ahUKEwiK1Ort6cODAxVG3TgGHY0yA9sQvgUoAXoECAcQAw

CO VS PO MAPPING

CO	PO							PSO		
	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

IC TECHNOLOGY

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 405			COURSE TITLE: IC TECHNOLOGY				
COMPULSORY : 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 the students to:

1 Understand IC design types, techniques and component-wise classification for the designs.
2 Draw and describe the functioning of the basic linear integrated circuits.
3 Relate the digital integrated circuits to the analogue counterparts and identify the various types of digital ICs.
4 Understand IC testing techniques, troubleshooting, reliability and quality control in IC manufacturing
5 Basic understanding of the areas of application and operation of ICs.

COURSE OUTCOMES

CO1	Recognize and implement various IC designs.
CO2	Familiarize with the Linear integrated circuits' functioning and properties.
CO3	Demonstrate digital ICs components and circuitry.
CO4	Comprehend the principles of testing and control of IC technology.
CO5	Interpret and recognize the applications of integrated circuits technology.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**IC Design:** 1.1. 1.1 Introduction to IC design 1.2. MOSFET and CMOS technology 1.3. Logic gate design 1.4. Combinational and sequential circuit design Course Outcome: CO1 Teaching Hours : 8 hrs Marks: 31 (PE+FINAL)
2	**Linear Integrated Circuits:** 2.1 Operational amplifiers and their applications 2.2 Voltage regulators 2.3 Analog multiplexers and demultiplexers Course Outcome: CO2 Teaching Hours : 7 hrs Marks: 21 (PE+FINAL)
3	**Digital Integrated Circuits:** 3.1 Introduction to digital ICs 3.2 Flip-flops 3.3 Counters 3.4 Registers 3.5 Memory circuits (RAM, ROM) Course Outcome: CO3 Teaching Hours : 9 hrs Marks: 16 (PE+FINAL)
4	**Testing and Quality Control:**

	4.1 IC testing techniques 4.2 Fault detection and correction 4.3 Reliability and quality control in IC manufacturing Course Outcome: CO4 Teaching Hours : 9 hrs Marks: 21 (PE+FINAL)
5	**Applications of IC Technology:** 5.1 Consumer electronics 5.2 Communication systems 5.3 Medical electronics 5.4 Automotive electronics Course Outcome: CO5 Teaching Hours : 7 hrs Marks: 11(PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Integrated Circuit Technology	Deepak Garg, S.K. Kataria & Sons,1st ed, 2016; reprint 2017	978-93-5014-617-0
2.	Introduction to Integrated Circuits	Victor H Grinich, Mc-Graw Hill College, 1st ed, 1975	978-0070248755
3.	Layout Techniques for Integrated Circuit Designers	Mikeal Sahrling, Artech House, August 2022	978-1630819101
4.	Integrated Circuits: Making the Miracle Chip	William Pletsch, Pletsch & Associates, January2000	0917927001

E-REFERENCES:

3. https://archive.nptel.ac.in/courses/117/103/117103066/

CO VS PO MAPPING

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

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

ELECTRONIC EQUIPMENT MAINTENANCE

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DPE 431			COURSE TITLE: Electronic Equipment Maintenance				
COMPULSORY / OPTIONAL: Program Elective							
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:

6. Understand the procedure of troubleshooting electronic equipment.
7. Test passive components such as Resistors, capacitors, and inductors.
8. Identify causes of failures in semiconductor devices and fault diagnosis in OPAMP circuits.
9. Apply knowledge of digital IC testing in fault diagnosis of digital circuits.
10. Repair surface mount assemblies and PCBs.
11. Evaluate electronic equipment's working condition.

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

CO1	Exemplify the procedure of troubleshooting electronic equipment.
CO2	Check passive components such as Resistors, capacitors, and inductors
CO3	Analyze causes of failures in semiconductor devices and fault diagnosis in OPAMP circuits
CO4	Apply knowledge of digital IC testing in fault diagnosis of digital circuits.
CO5	Examine surface mount assemblies and PCBs.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Fundamental Troubleshooting Procedures Inside an Electronic Equipment** 1.1 Equipment Failures And Causes Of Equipment Failures 1.2 Fault Management, Fault Finding Aids 1.3 Test And Measuring Instruments, Troubleshooting Techniques 1.4 Approaching Components For Tests 1.5 Corrective Action Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 31 (PE+FINAL)
2	**Passive Components and Their Testing** 2.1 Passive Component- Resistor, Testing of Resistor 2.2 Failures in fixed resistors 2.3 Failures in Potentiometer, Testing and Servicing of Potentiometer 2.4 Passive Component: Capacitor, Testing of capacitor, Failure in a capacitor 2.5 Passive Component: Inductors, Testing of Inductors Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
3	**Testing of Semiconductor Devices** 3.1 Causes of failure in Semiconductor Devices, Types of failure semiconductor device 3.2 Diodes: Test Procedure For Diode, P-N junction Diodes, Zener Diode, Light-emitting Diode 3.3 BJT: Testing NPN transistor, Testing PNP transistor, 3.4 Field Effect Transistors: Testing of field effect transistor 3.5 Faults Diagnosis In Op-Amp Circuits Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)

4	**IC Testing**: 4.6 IC Identification Of Ic's, IC Pin-Outs 4.7 Handling ICs, Digital Troubleshooting Methods, 4.8 Special Considerations For Fault Diagnosis 4.9 Handling Precautions For Electronic Devices 4.10 Function And Testing Of Flip Flops Counters And Registers Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
5	**Repairing of Surface Mount Assemblies:** 1.1 Surface Mount Devices, 1.2 Surface Mounting Semiconductor Packages 1.3 Packaging Of Passive Components As SMD 1.4 Repairing Surface-Mounted PCB 1.5 Rework Stations Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 11 (PE+FINAL)

TEXT & REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electronic Equipment Maintenance **(T)**	Dr. Chanchal Sharma, Prof. Pradeep Chindhi. All India Council for Technical Education	978-81-961834-0-0
2.	Troubleshooting and Maintenance of Electronic Equipments	Students Handbooks, Class XII, Central Board of Secondary Education.	
3.	Equipment Maintenance and Repair in Laboratory Setting	Jimmy C. Santos, 2014	
4.	Electronics Repair Manual	Gene B. Williams, Weka Publishing Inc., 1993	

E-REFERENCES:

https://ekumbh.aicte-india.org/index.php

CO VS PO MAPPING

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

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

ELECTRONIC DEVICES

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DPE 432			COURSE TITLE: Electronic Devices				
OPTIONAL : Programme Elective							
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 the students to:

1 Understand the underlying physics of semiconductors and the various categories of classifications.
2 Draw and describe the functioning of the major semiconductor devices, viz, diode, BJTs and FETs.
3 Relate the components and circuits of various diode applications.
4 Understand transistor biasing techniques and the various amplifier configurations and characteristics.
5 Basic understanding of the areas of application and operation of FETs.

COURSE OUTCOMES

CO1	Comprehend the principles of semiconductor physics.
CO2	Familiarize with the functioning and properties of semiconductor devices.
CO3	Demonstrate diode-based rectifiers, filters components and clipping and clamping circuitry.
CO4	Recognize and implement various transistor biasing techniques and amplifier circuits.
CO5	Interpret and recognize the characteristics and applications of Field Effect Transistors.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Semiconductor Physics:** 1.1 Crystal structure of semiconductors 1.2 Energy bands and charge carriers 1.3 Intrinsic and extrinsic semiconductors Course Outcome: CO1 Teaching Hours : 8 hrs Marks: 31 (PE+FINAL)
2	**Semiconductor Devices:** 2.1 Diodes: PN junction diode, Zener diode, Schottky diode 2.2 Bipolar Junction Transistors (BJTs) 2.3 Field-Effect Transistors (FETs) Course Outcome: CO2 Teaching Hours : 7 hrs Marks: 21 (PE+FINAL)
3	**Diode Applications:** 3.1 Rectifiers: Half-wave and full-wave rectifiers 3.2 Filters and voltage regulation 3.3 Diode clipping and clamping circuits Course Outcome: CO3 Teaching Hours : 9 hrs Marks: 16 (PE+FINAL)
4	**Transistor Biasing and Amplifiers:** 4.1 DC biasing of transistors

	4.2 Common-emitter and common-base amplifier configurations 4.3 Amplification concepts and parameters Course Outcome: CO4 Teaching Hours : 9 hrs Marks: 21 (PE+FINAL)
5	**Field-Effect Transistors (FETs):** 5.1 Types of FETs: JFET and MOSFET 5.2 FET characteristics and biasing 5.3 FET amplifiers and applications Course Outcome: CO5 Teaching Hours : 7 hrs Marks: 11(PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Physics of semiconductor Devices	S. M Sze, WILEY INDIA, 3rd ed, 2015	978-8126517022
2.	Semiconductor Physics and Devices-Basic Principles	D. A. Neamen, Mc-Graw Hill Higher Education, 3rd ed, 2002	978-0072321074
3.	Physics and Technology of Semiconductor Devices	A S Grove, john Wiley & Sons Inc.,1st ed January 1967	978-0471329985

E-REFERENCES:

1. https://www.tutorialspoint.com/semiconductor_devices/index.htm
2. https://onlinecourses.nptel.ac.in/noc22_ee97/preview
3. https://onlinecourses.nptel.ac.in/noc22_ee13/preview

CO VS PO MAPPING

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

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

COMPUTER SYSTEM ARCHITECHTURE

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DPE 433			COURSE TITLE: Computer System Architecture				
COMPULSORY / OPTIONAL: Programme Elective							
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 to basics of digital logic circuits, combinational and sequential circuit.
2.	Understand the basic architecture and organization of systems along with their performances.
3.	Understand the basics of basics of processing units, pipeline concept and its Hazards.
4.	Know the basics of different memory organization.
5.	Familiar with Memory and I/O Organization.

Course Outcomes: After the completion of this course, students will be able to

1.	Explain digital logic circuits for the design of combinational and sequential circuits.
2.	Explain the basic architecture and organization of systems along with their performances.
3.	Explain the basics of processing units and pipeline concept.
4.	Explain the RAM, ROM, Direct Memory Access, Memory Hierarchy, Cache Memories, Virtual Memory and its Performance Considerations.
5.	Explain memory organization, I/O organization and its impact on computer cost /performance.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	***Digital Logic Circuits And its Components:*** 1.1 Logic Gates, truth tables, Boolean Algebra, Karnaugh Map, circuit simplification using K-Map, Don't Care Conditions, flip-flops, characteristic tables. 1.2 Combinational circuits, sequential circuits, Half Adder, Full Adder, 1.3 Decoders, Multiplexers 1.4 Registers. Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 31 (PE+FINAL)
2	***Basic Structures of Computers:*** 2.1 Basic Structure of Computers: Computer Types, Functional Units, Input Unit, 2.2 Memory Unit, Arithmetic and Logic Unit, Output Unit, Control Unit 2.3 Basic Operational Concepts: Fixed- and floating-point Representation 2.4 Arithmetic Operations, Performance Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
3	***Basic Processing Unit & Pipelining:*** 3.1 Basic Processing Unit: Some Fundamental Concepts, Instruction Execution, Hardware Components 3.2 Instruction Fetch and Execution Steps, Control Signals 3.3 Hardwired Control, CISC-Style Processors. 3.4 Pipelining: Basic Concept, Pipeline Organization, Pipelining Issues 3.5 Data Dependencies, Memory Delays, Branch Delays, Pipeline Performance Evaluation.

	Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)
4	***Memory Organization:*** 4.1 Basic Concepts, Semiconductor RAM Memories, Read-only Memories, 4.2 Direct Memory Access, Memory Hierarchy, Cache Memories, Performance Considerations, 4.3 Virtual Memory, Memory Management Requirements, Secondary Storage. Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
5	***Input Output & Parallel Processing:*** 5.4 Basic Input Output: Accessing I/O Devices, Interrupts 5.5 Input Output Organization: Bus Structure, Bus Operation, Arbitration, Interface, Interconnection Standards. 5.6 Parallel Processing: Hardware Multithreading, Vector (SIMD) Processing, 5.7 Shared-Memory Multiprocessors, Cache Coherence, Message-Passing Multicomputers. 5.8 Parallel Programming for Multiprocessors, Performance Modeling Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 11 (PE+FINAL)

Text and Reference Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Computer Organization and Design: The Hardware/Software Interface	David A. Patterson and John L. Hennessy Fifth Edition, Morgan Kaufmann / Elsevier, 2014.	9780128012857
2.	Computer Organization and Embedded Systems	Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Sixth Edition, Tata McGraw Hill, 2012.	10. 0073380652; 13. 978-0073380650
3.	Computer System Architecture	Mano M. Morris, Revised 3rd Edition, Pearson, 1992	10. 0131755633; 13. 978-0131755635
4.	Digital Design	Mano M, Pearson Education Asia, 1995	13: 978-0132129947; 10: 0132129949
5.	Computer Organization and Embedded Systems	Hamachar Carl et. Al, 6th Edition, McGraw Hill	13: 978-0073380650
6.	Computer Organization and Architecture	William Stallings, Eighth Edition, Pearson Education, 2010	10. 0136073735; 13. 978-0136073734
7.	Computer Architecture and Organization	John P. Hayes, Third Edition, Tata 52 McGraw Hill, 2012	10. 9781259028564; 13. 978-1259028564

E-REFERENCES:

1. https://www.youtube.com/watch?v=4TzMyXmzL8M&list=PL59E5B57A04EAE09C
2. https://www.youtube.com/watch?v=msqxkEKFg8I&list=PLgHucKw979AvcnTpPNZMZyORdL5HvTr9m

CO VS PO MAPPING

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

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

DIGITAL ELECTRONICS AND APPLICATION

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DOE 431			COURSE TITLE: Digital Electronics and Application				
COMPULSORY / OPTIONAL: Open Elective							
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 basics of digital electronics.
2.	Apply the knowledge of digital electronics to construct various digital circuits.
3.	Analyse the characteristics and explain the outputs of digital circuits.
4.	Evaluate and asses the application of the digital circuits.
5.	To realize various Multivibrators using transistors, op-amp and other discrete components.

Course Outcomes: After the completion of this course, students will be able to

1.	Explain the concept of digital electronics.
2.	Apply the knowledge to produce digital electronics circuits.
3.	Analyse and categorize digital circuits.
4.	Justify the uses of different digital circuits.
5.	Demonstrate the Bistable, Monostable and Astable Multivibrators using discrete components.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	***Basics of Digital Electronics and Logic Families:*** 1.1 Review of number systems and codes used in digital system. 1.2 Review of arithmetic used in digital system. 1.3 Logic gates associated postulates and laws. 1.4 RTL, DTL, TTL, ECL, and CMOS Logic Circuits, Logic levels, voltages and currents. 1.5 Fan-in, fan-out, speed, power dissipation. Comparison of logic families. Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 31 (PE+FINAL)
2	***Simplification of Boolean functions:*** 2.1 Boolean Algebra, Basic theorems and Properties, De Morgan's theorem 2.2 Canonical & Standard forms, Simplification of a Boolean function using K-Map 2.3 POS & SOP simplification, Prime implicant. 2.4 NAND and NOR implementation. Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
3	***Design of Combinational Circuits:*** 3.1 Analysis and design procedure, Parity Generators and Checkers

	3.2 Adders, Subtractors, Look ahead carry, Adder, 4-bit BCD adder/subtractor 3.3 Multiplexers, De-multiplexers 3.4 Magnitude comparator, Encoder, Decoder Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)
4	***Design of Sequential Circuits and Memories:*** 4.1 Basic Latch, Flip-Flops (SR, D, JK, T and Master-Slave), Triggering of Flip Flops, 4.2 Synchronous and asynchronous counters 4.3 Registers, 4-bit shift register- SISO, SIPO, PISO and PIPO. 4.4 Design of sequential circuit using state diagrams. Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
5	***Multivibrators and Memory Devices*** 5.1 Astable, Monostable and Bistable Multivibrators using BJTs. 5.2 Schmitt trigger circuit. 5.3 Multivibrators using op-amp and IC 555 timer. 5.4 Introduction to Memories – RAM Organization, ROM organization. Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 11 (PE+FINAL)

TEXT and REFERENCE Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Digital Design	Mano M, 5th Edition, Pearson Education Asia, 1995	13: 978-0132129947; 10: 0132129949
2.	Digital principles & Application	Albert Paul Malvino & Donald P. Leach, McGraw Hill Education; Eighth edition, 2014	978-9339203405
3.	Digital Electronics	Roger L. Tokheim Macmillian, McGraw-Hill Education (ISE Editions); International 2 Revised edition, 1999.	978-0071167963
4.	Digital Electronics – an introduction to theory and practice	William H. Gothmann, Prentice Hall India Learning Private Limited; 2 edition, 2000.	978-8120303485
5.	Fundamentals of Logic Design	Charles H. Roth Jr., Jaico Publishing House; First edition, 1992.	978-8172247744
6.	Digital Electronics	R. Anand, Khanna Publications, New Delhi, 2 Edition, 2018.	978-93-82609445

E-REFERENCES:

1. digital electronics nptel lecture - Search Videos (bing.com)

CO VS PO MAPPING

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

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

ANALOG ELECTRONICS

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DOE 432			COURSE TITLE: Analog Electronics				
OPTIONAL : Open Elective							
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 the students to:

1 Draw and describe the basic circuits of rectifier and filters.
2 Understand transistor operation, configuration, stability and biasing techniques.
3 Relate the frequency response of BJT amplifier and identify the various types of transistor amplifiers.
4 Understand feedback concepts and operation of oscillators.
5 Basic understanding of FET and MOSFET operation and characteristics.

COURSE OUTCOMES: At the end of the course the students will be able to:

CO1	Interpret and recognize the applications of rectifier and filter circuits.
CO2	Demonstrate transistor operation, configuration, stability and biasing techniques.
CO3	Recognise and implement various types transistor amplifiers.
CO4	Comprehend the principles of feedback circuits and the functioning of oscillators.
CO5	Familiarize with the fundamentals of FET and MOSFET functioning and properties.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Rectifier and Filter Circuits** 1.1 Diode as half wave, full wave and bridge rectifier. 1.2 DC Output Voltage and Current of rectifiers. 1.3 PIV, rectification efficiencies and ripple factor calculations. 1.4 Shunt capacitor filter, series inductor filter. 1.5 LC filter and RC filter. Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 31 (PE+FINAL)

2	**Fundamentals of Transistors** 2.1 CB, CE, CC configuration of the transistor; 2.2 Input and output characteristics in CB and CE configurations; 2.3 Current amplification factors. 2.4 D.C load line and selection of operating point. 2.5 Need for stabilization of operating point. 2.6 Different types of biasing circuits. Course Outcome: CO2 Teaching Hours: 9 hrs Marks: 21 (PE+FINAL)
3	**Small Signal Analysis and Types of BJT Amplifiers** 3.1 Hybrid -π Model for Two-Port Network Analysis 3.2 Small signal analysis of BJTs at low frequencies. 3.3 Single and Multistage Amplifiers 3.4 Transistor Power Amplifiers 3.5 Tuned Transistor Voltage Amplifiers Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)
4	**Feedback in Amplifier and Oscillator Circuits** 4.1 Basic principles and types of feedback. 4.2 Derivation of expression for gain of an amplifier employing feedback, Effect of feedback (negative) on gain, stability, distortion and bandwidth of an amplifier. 4.3 RC coupled amplifier with emitter bypass capacitor, Emitter follower amplifier and its application 4.4 Barkhausen criterion for oscillations, 4.5 Different oscillator circuits (working principles)-tuned collector, Hartley, Colpitts, phase shift, Wien's bridge, and crystal oscillator. Course Outcome: CO4 Teaching Hours: 9 hrs Marks: 21 (PE+FINAL)
5	**Field Effect Transistors** 5.1 Construction, operation and characteristics of FET and its application. 5.2 Construction, operation and characteristics of MOSFET in depletion and enhancement modes and their applications. 5.3 CMOS - advantages and applications. 5.4 Comparison of JFET, MOSFET and BJT 5.5 FET amplifier circuit and its working principle. (No analysis). Course Outcome: CO5 Teaching Hours: 6 hrs Marks: 11 (PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electronic Principles	Albert Paul Malvino; McGraw Hill Inc., USA; 6th Edition @	978- 0028028385
2.	Basic Electronics	J.B. Gupta, Ms/. S. K. Kataria & Sons, Third Edition, Reprint @2022	978-8190691949
3.	Basic Electronics and Linear Circuit	NN Bhargava and Kulshreshta, Tata McGraw Hill Education, Europe.	978-0074519653

E-REFERENCES:

https://archive.nptel.ac.in/courses/117/103/117103063/

CO VS PO MAPPING

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

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

CIRCUIT THEORY AND APPLICATION

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DOE 433			COURSE TITLE: Circuit Theory and Application				
COMPULSORY / OPTIONAL: Open Elective							
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:

12. Apply principles of Electrostatics
13. Interpret principles of magnetic circuits
14. Demonstrate graph theory w.r.t. electrical network
15. Analyse mechanical systems with its analogus electrical equivalent
16. Apply Laplace Transform

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

CO1	Solve electrostatics problems.
CO2	Solve problems of magnetic circuits
CO3	Implement Graph theory for electrical networks
CO4	Relate Mechanical Systems with its Electrical Equivalent
CO5	Solve problems on Laplace Transform

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Electrostatics** 1.1 Capacitance, capacitors connected in series & parallel 1.2 dielectrics, capacitance of parallel – plate capacitors 1.3 Electric flux, Electric flux density 1.4 Electric field intensity, permittivity 1.5 Coulomb's law, Energy stored in a electric field. Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 31 (PE+FINAL)
2	**Magnetic Circuits** 2.1 Self and mutual inductance 2.2 Inductors connected in series & Parallel 2.3 Faraday's law of electromagnetic induction 2.4 Definitions of magnetic flux, Magnetic flux density 2.5 Magnetic Field Intensity, Permeability, Energy stored in a magnetic field Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
3	**Graph Theory** 3.1 Introduction, Planar and Non-Planar Graphs 3.2 Tree and Co-Tree, Twigs and Links 3.3 Incidence Matrix, Properties of Incidence Matrix 3.4 Incidence Matrix and KCL, Link Currents, Tie-Set Matrix, Tie-Set Matrix and Branch Currents 3.5 Cut-Set and Tree Branch Voltages, Cut-Set Orientation, Cut-Set Matrix and KCL for Cut-Sets Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 16 (PE+FINAL)
4	**Analogous System** 4.1Mathematical Model 4.2Modelling of Mechanical Systems: Translational Motion, Rotational Motion

	4.3Force Voltage Analogy 4.4Force Current Analogy 4.5 Nodal Method for Representation Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 21 (PE+FINAL)
5	**Laplace Transform** 5.1 Laplace Transform 1.2 Inverse Laplace Transform 1.3 Laplace Transform of some common time functions 1.4 Properties of Laplace Transform 1.5 Partial Fraction Expansion Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 11 (PE+FINAL)

TEXT & REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Networks and Systems (T)	Ashfaq Husain, Khanna Book Publishing Co. (P) Ltd., Second Edition, 2019	978-8187522089
2.	Engineering Circuit Analysis (R)	W. H. Hayt, J. E. Kemmerly and S. M. Durbin, McGraw Hill Education; Eighth Edition, 2013	978-1259098635
3.	Circuits and Networks Analysis and Synthesis (R)	A. Sudhakar, Shyammohan S. Palli, McGraw Hill Education, Fifth Edition, 2017	978-9339219604
4.	Network Theory Analysis and Synthesis (R)	Smarajit Ghosh, PHI Learning Private Limited, First Edition, 2005	978-9332511040

E-REFERENCES:

https://ekumbh.aicte-india.org/index.php

https://dokumen.pub/qdownload/network-analysis-and-synthesis-9780070144781.html

CO VS PO MAPPING

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

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

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 404			COURSE TITLE: Analog Communication Lab				
COMPULSORY / OPTIONAL: Core							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

RATIONALE: This course enables the students to:

1.	Understand the signal for DSB AM generation.
2.	Understand the de-modulation of AM wave using envelope detector & linear diode detector.
3.	Understand the signals for the modulation and de-modulation of SSB signal.
4.	Understand the signals for the modulation & de-modulation of FM wave.
5.	Understand the Voice transmission with DSB/SSB AM transmission/reception.

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

CO1	Analyze the signal for DSB AM generation.
CO2	Observe the waveform for the de-modulation of AM wave using envelope detector & linear diode detector.
CO3	Observe the waveform for the modulation and de-modulation of SSB signal.
CO4	Observe the waveform of modulation & de-modulation of FM wave.
CO5	Analyze the Voice transmission with DSB/SSB AM transmission/reception.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	1. 1 Observation of signals for double side band AM generation. 1. 2 Determination of modulation index from DSB AM wave. Course Outcome: CO1 Teaching Hours: 4 hrs
2	2.1 Observation of signals for demodulation of AM wave using envelope detector. 2.2 Observation of signals for demodulation of AM wave using linear diode Course Outcome: CO2 Teaching Hours: 4 hrs
3	3.1 Observation of signals for modulation of SSB signal. 3.2 Observation of signals for demodulation of SSB signal. Course Outcome: CO3 Teaching Hours: 4 hrs
4	4.1 Observation of signals for FM wave using Varactor Modulator. 4.2 To measure the frequency deviation and modulation index using FM wave. Course Outcome: CO4 Teaching Hours: 4 hrs
5	5.1 Observation of signals for the demodulation of FM wave using PLL.

	5.2 Voice transmission with DSB/SSB AM transmission/reception. Course Outcome: CO5 Teaching Hours: 4 hrs

TEXT AND REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Communication Systems	S. Haykin, Wiley India Pvt. Ltd, 4th Edition 2001	9971513056, 9789971513054
2.	Communication Systems	R. P. Singh and S.D Sapre, Tata McGraw Hills Education Pvt. Ltd, 3rd Edition, 2012	9781259004605
3	Analog Communication Systems	Sanjay Sharma, S.K. Kataria & Sons, 7th Edition, 2016	978-93-5014-379-7
4..	Modern Digital & Analog Communication System	B.P. Lathi, 3rd Edition, Oxford University Press, 1998	9780198073802, 0198073801
5.	Electronic Communication Systems	Kennedy & Davis, 4th Edition, McGraw Hill Education, 2011	13. 978-0071077828

E-REFERENCES:

1. Analog communication - Course (nptel.ac.in)
2. Systems, communication and control laboratory : Electronics & Communications : Amrita Vishwa Vidyapeetham Virtual Lab

CO VS PO MAPPING

	PO							PSO		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**
1	2	2	2	2	1	3	3	2	2	2
2	2	3	3	2	1	3	3	2	2	2
3	2	2	2	2	1	3	3	2	2	2
4	2	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
MICROPROCESSOR AND MICROCONTROLLER LAB

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DEC 404		COURSE TITLE: Microprocessor and Microcontroller Lab					
COMPULSORY / OPTIONAL: Core							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

RATIONALE: Students are expected to:

1. List each component's various components and characteristics in an 8085 Microprocessor and commands for working on the experiment kit.
2. Understand the programming concepts of 8085 for efficient coding
3. Write and explain algorithms and flowcharts for simple programs.
4. Explain examples for different addressing modes and no. of bytes for different instructions.
5. Write the code for a given requirement, execute the program, debug, and demonstrate that the program produces the required result/output.

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

CO1	Identify and explain the functionality of various components in an 8085 Microprocessor and 8051 Microcontroller and work on experiment kit.
CO2	Explain the programming concepts of 8085/8051 for efficient coding.
CO3	Write and explain algorithms and flowcharts for simple programs.
CO4	Explain examples for different addressing modes and no. of bytes for different instructions.
CO5	Write the code for a given requirement, execute the program, debug, and demonstrate that the program produces the required result/output.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE: Basics of 8085 Training Kit and Assembly Language Programming** 1. Study of 8085 microprocessor training kit. 2. Basics of Assembly Language Programming Course Outcome: CO1 Teaching Hours: 4 hrs
2	**TITLE: Program for addition** 2.1 Write an ALP to add two 8-bit numbers; sum: 8 Bits. 2.2 Write an ALP to add two 8-bit numbers; sum: 16 Bits. 2.3 Write an ALP to add two 16-bit numbers; sum: 16 Bits or more. Course Outcome: CO2 Teaching Hours: 4 hrs
3	**TITLE: ALP for Subtraction and Multiplication** 3.1 Write an ALP to subtract two unsigned numbers and store the result in memory location XX90H. How would you determine whether the result is a straight binary number or 2's complement? Verify with examples. 3.2 Write an ALP to multiply two 8-bit numbers, the product being 16 bits. Course Outcome: CO3 Teaching Hours: 4 hrs
4	**TITLE: ALP for Sorting and Block transfer of Data** 4.1 (a)Write an ALP to arrange a data array in ascending order. (b) Write an ALP to arrange a data array in descending order 4.2 Write an ALP for block transfer of data. Course Outcome: CO4 Teaching Hours: 4 hrs

5	**TITLE: Basics of 8051 Training Kit** 5.1 Study of microcontroller INTEL 8051 Training Kit. 5.2 Write and execute an assembly language program for 8-bit addition. 5.3 Write and execute an assembly language program for 8- bit subtraction 5.4 Write and execute an assembly language program for 8- bit multiplication 5.5 Write and execute an assembly language program for 8- bit division. Course Outcome: CO5 Teaching Hours: 4 hrs

TEXT AND REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Fundamentals of Microprocessor and Microcontrollers	B. Ram, Dhanpat Rai Publications, Seventh Edition,31 March 2018	978-8189928605
2.	Microprocessor Architecture, Programming, and Applications with the 8085	Ramesh Gaonkar, Penram International Publishing (I) PVT. LTD., 6th Edition, 1 October 2013	978-8187972884
3.	The 8051 Microcontroller	Kenneth J. Ayala THOMSON, Cengage Learning, Third Edition	978-1401861582
4.	Microcontrollers (Theory and Applications)	Ajay V. Deshmukh, McGraw-Hill Education (India) Pvt Limited, 2005	978-0070585959
5.	The 8051 Microcontroller and Embedded Systems	Md. Ali Mazidi, Pearson Education India, 2007	9788131758991

E-REFERENCES:

1. https://dokumen.pub_microprocessors-and-microcontrollers-architecture-programming-and-system-design-8085-8086-8051-8096-8120331915-9788120331914
2. https://www.google.com/search?sca_esv=595668565&sxsrf=AM9HkKl1daRHzM4OLRqH_0V6BZO_w-uAHg:1704374518334&q=vdoc.pub_microprocessors-and-microcontrollers-architecture-programming-interfacing-using-8085-8086-and-8051&nfpr=1&sa=X&ved=2ahUKEwiK1Ort6cODAxVG3TgGHY0yA9sQvgUoAXoECAcQAw

CO VS PO MAPPING

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

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

MINOR PROJECT

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DPR 431			COURSE TITLE: Minor Project				
COMPULSORY : Programme Project							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	4	4	2	60	40	100

RATIONALE: These minor projects provide students with practical exposure to electronic circuits, communication systems, and microcontroller-based applications. The course content associated with each project helps students develop skills and knowledge in various areas of electronics and communication engineering.

COURSE OUTCOMES

CO1	Comprehend the principles of digital alarm clock.
CO2	Familiarize with the functioning and properties of Audio Amplifier.
CO3	Demonstrate FM transmitter and receiver circuitry.
CO4	Recognise and implement digital voltmeter circuit using microcontroller.
CO5	Interpret and recognize the electronics and programming Traffic Light Controllers.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Digital Alarm Clock:** 1.1 Digital electronics principles 1.2 Microcontroller programming 1.3 Real-time clock (RTC) interfacing 1.4 Display technology (LED, LCD) Course Outcome: CO1 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
2	**Audio Amplifier:** 2.1 Analog electronics 2.2 Operational amplifier circuits 2.3 Power amplifier design 2.4 PCB layout and fabrication Course Outcome: CO2 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
3	**FM Transmitter and Receiver:** 3.1 Analog communication systems 3.2 Frequency modulation (FM) 3.3 RF circuit design 3.4 Antenna design and theory Course Outcome: CO3 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
4	**Digital Voltmeter using Microcontroller:** 4.1 Analog-to-digital conversion 4.2 Microcontroller programming 4.3 Display technology (LED, LCD) 4.4 Calibration and accuracy considerations Course Outcome: CO4 Teaching Hours : 8 hrs Marks: 20 (PE+FINAL)
5	**Traffic Light Control System:** 5.1 Digital electronics 5.2 Microcontroller programming

	5.3 Sensor integration (for traffic detection) 5.4 Control algorithms for traffic lights Course Outcome: CO5 Teaching Hours : 8hrs Marks: 20(PE+FINAL)

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Analog Electronics	L.K.Maheshwari,& M M S Anand, PHI Pvt Ltd, 1st ed, 2005	81-203-2722-5
2.	Radio Frequency Electronics: Circuit & Applications	J B Hagen, Cambridge University Press,2nd ed, 1996	978-0521-88974-2
3.	Electronic Circuits and Systems	Owen Bishop, ELSEVIER ,4th ed, 2011	978-008-096634-2
4.	Embedded Systems Architecture, Programming and Design.	Rajkamal, Tata McGraw Hill, 2011	9780070667648
5.	Practical Design of Digital Circuits	Ian Kampel, ELSEVIER Ltd. , 1983	978-0-408-01183-9

E-REFERENCES:

1. https://www.youtube.com/watch?v=IdYad5GUN40
2. https://www.youtube.com/watch?v=0b2lGOjCRZI
3. https://www.youtube.com/watch?v=KOiM-IzlfWs&vl=en
4. https://www.electronicsforu.com/electronics-projects/simple-fm-receiver
5. https://www.youtube.com/watch?v=_1sBdcMcHE0
6. https://www.youtube.com/watch?v=6MW1Gr9xVqE

CO VS PO MAPPING

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

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

Essence of Indian Knowledge and Tradition

PROGRAMME: Diploma in Electronics and Communications Engineering							
COURSE CODE: DAU 401			COURSE TITLE: Essence of Indian Knowledge and Tradition				
COMPULSORY: Mandatory course -Non-Credit							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
2	0	0	2	0	50	50	100

RATIONALE: Incorporating the essence of Indian knowledge systems and traditions into education can enrich students' learning experience and equip them with valuable life skills and perspectives as follows:

1. **Holistic Development**: Indian knowledge systems emphasize holistic development, focusing on physical, mental, and spiritual well-being. Teaching these traditions can help students develop a more balanced and comprehensive understanding of life.
2. **Cultural Heritage**: Learning about Indian traditions can help students appreciate and preserve their cultural heritage. It fosters a sense of pride and identity, especially important in a globalized world.
3. **Critical Thinking**: Many Indian philosophical and scientific texts encourage critical thinking and questioning. Teaching these traditions can help cultivate a questioning mindset among students.
4. **Environmental Consciousness**: Traditional Indian knowledge systems often have a deep respect for nature and emphasize sustainable living. Teaching these traditions can help raise awareness about environmental issues.
5. **Ethical Values**: Indian traditions emphasize ethical values such as compassion, truthfulness, and non-violence. Teaching these values can help inculcate a strong moral compass in students.
6. **Global Perspective**: Many concepts from Indian traditions, such as yoga and Ayurveda, have gained global acceptance. Teaching these traditions can help students appreciate diverse perspectives and cultures.

COURSE OUTCOMES: At the end of the course, the students are:

CO1	Aware about context in which they are embedded i.e. Indian culture and civilization including its Knowledge System and Tradition.
CO2	Able to understand the knowledge, art and creative practices, skills and values in ancient Indian system.
CO3	Able to study the enriched scientific Indian heritage
CO4	Able to identify and recognize the contribution from Ancient Indian system & tradition to modern science & Technology

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to IKS** **Lecture 1:** Indian Knowledge System **Lecture 2:** Indian Culture & Civilization **Lecture 3:** Ancient Indian Chemistry /Ancient Indian Metallurgy **Lecture 4:** Ancient Indian Mathematics L**ecture 5:** Ancient Indian Astronomy /Indian Astronomical Instruments **Lecture 6:** Indian Knowledge System (Upveda: Ayurveda) / Indian Knowledge System (Upveda: Gandharveda) / Indian Knowledge System (Vedangas: Shiksha, Kalpa, Vyakrana) / Indian Knowledge System (Vedangas: Jyotisha, Nirukta, Chandas) **Lecture 7:** Indian Architecture I: Sthapatya-Veda / Indian Architecture II: Temples /Indian Architecture III: Town & Planning **Lecture 8:** Indian Philosophical System Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
2	**Module 2 –** Introduction to Creative Practices -I **Lecture 1:** Dhatuvada: art of metallurgy / Akara jnana: art of mineralogy /Vastuvidya: art of engineering /Yantramatrika: art of mechanics / Takshana: art of carpentry

	Lecture 2: Chalitakayoga: art of practicing as a builder of shrines/ Raupyaratnapariksha: art of testing silver and jewels/. Maniraga jnana: art of tinging jewels/ Sucivayakarma: art of needleworks and weaving Course Outcome: CO2 , CO3, CO4 Teaching Hours: 4+4=8 hrs Marks: 20(PE+FINAL)
3	**Module 3 –** Introduction to Creative Practices -II **Lecture 1:** Vadya vidya: art of playing on musical instruments / Geet vidya : art of singing /Nritya vidya: art of dancing /Natya vidya: art of theatricals /Alekhya vidya: art of painting / Viseshakacchedya vidya: art of painting the face and body with color Course Outcome: CO2 , CO3, CO4 Teaching Hours: 4hrs Marks: 20(PE+FINAL)
4	**Module 4 –** Introduction to Creative Practices -III **Lecture 1:** Udakavadya: art of playing on music in water / Manasi kavyakriya: art of composing verse / Bhushanayojana: art of applying or setting ornaments / Citrasakapupabhakshyavikarakriya: art of preparing varieties of delicious food / Dasanavasanangaraga: art of applying preparations for cleansing the teeth, cloths and painting the body Course Outcome: CO2 , CO3, CO4 Teaching Hours: 4hrs Marks: 20(PE+FINAL)
5	**Module 5 –** Introduction to Creative Practices -IV **Lecture 1:** Utsadana: art of healing or cleaning a person with perfumes / Vastragopana: art of concealment of cloths / Balakakridanaka: art of using children's toys / Tandulakusumabalivikara: art of preparing offerings from rice and flowers / Pushpastarana: art of making a covering of flowers for a bed Course Outcome: CO2 , CO3, CO4 Teaching Hours: 4hrs Marks: 20(PE+FINAL)

TEXT BOOK:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Indian Knowledge Systems - Vol 1 & 2	Avadhesh K. Singh, Kapil Kapoor, 1st Edition, D.K. Print World (P) Ltd, October 2005	978-8124603369

REFERENCE BOOKS:

1. Textbook on IKS by Prof. B Mahadevan, IIM Bengaluru
2. Kapur K and Singh A.K (Eds) 2005). Indian Knowledge Systems, Vol. 1. Indian Institute of Advanced Study, Shimla. Tatvabodh of sankaracharya, Central chinmay mission trust, Bombay, 1995.
3. The Cultural Heritage of India. Vol.I. Kolkata:Ramakrishna Mission Publication, 1972.
4. Nair, Shantha N. Echoes of Ancient Indian Wisdom. New Delhi: Hindology Books, 2008.
5. Dr. R. C. Majumdar, H. C. Raychaudhuri and Kalikinkar Datta: An Advanced History of India (Second Edition) published by Macmillan & Co., Limited, London, 1953.
6. Rao, N. 1970. The Four Values in Indian Philosophy and Culture. Mysore: University of Mysore.
7. Avari, B. 2016. India: The Ancient Past: A History of the Indian Subcontinent from c. 7000 BCE to CE 1200. London: Routledge. 13. Gandhi - Romain Rolland (English)

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1. https://nptel.ac.in/courses/101104065
2. https://www.youtube.com/@IKS_Media./videos