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 [2nd Year Onwards]
Based on CBCS system & OBE model
Recommended scheme of study
(For Diploma in Electronics & Communications Engineering)

Semester of Study (Recommended)	Category of course	Course Code	Subjects	Mode of delivery & credits *L-Lecture; T-Tutorial; P-Practical*			Total Credits *C- 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 431/432/433/434	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
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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

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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

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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
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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

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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

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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
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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