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**

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PROGRAMME ELECTIVES (PE)*

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

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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
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DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

SIGNALS AND SYSTEMS

PROGRAMME: Diploma in Electronics and Communication Engineering							
COURSE CODE: DPE 434			COURSE TITLE: Signals and Systems				
OPTIONAL: PE II							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE: The concepts of signals and systems arise in a wide variety of fields, and the ideas and techniques associated with these concepts play an important role in such diverse areas of science and technology as communications, aeronautics and astronautics, circuit design, acoustics, seismology, biomedical engineering, energy generation and distribution systems, chemical process control, and speech processing.

1. To understand the fundamental characteristics of signals and systems.
2. To understand the concepts of different transforms for signal and system.
3. To understand signals and systems in terms of both the time and transform domains.
4. To develop the mathematical skills to solve problems involving convolution, filtering, modulation, and sampling.
5. To understand the response of LTI systems using Transform theory.

SEME
MODI

COURSE OUTCOMES: AFTER COMPLETION THE STUDENT WILL BE ABLE TO:

CO1	Define and classify various types of signals and systems; perform basic operations on signals in both time and frequency domains.
CO2	Analyse discrete and continuous-time systems using time-domain techniques such as difference/differential equations and convolution.
CO3	Apply Fourier series and Fourier transform techniques to analyse periodic and aperiodic signals in the frequency domain.
CO4	Use Laplace Transform methods for solving and analysing continuous-time LTI systems, including system behaviour and stability.
CO5	Employ z-Transform techniques to analyse discrete-time systems, determine system response, and assess stability and causality.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**INTRODUCTION TO SIGNALS AND SYSTEMS** 1.1 Definition and Classification of Signals: Continuous-time, Discrete-time, and Digital Signals 1.2 Elementary Signals: Unit Step, Ramp, Parabolic, Impulse, Sinusoidal, Complex Exponential, Time-Limited Signals 1.3 Basic Operations on Signals: Time Shifting, Reversal, Scaling (Time and Amplitude), Addition, Multiplication 1.4 Classification of Signals: Deterministic vs. Random, Periodic vs. Aperiodic, Even and Odd, Energy and Power, Causal and Non-Causal 1.5 Systems: Definition, Classification (LTI, Static/Dynamic, Causal/Non-Causal, Time-Invariant/Variant), System Modeling Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)
2	**TIME DOMAIN ANALYSIS OF DISCRETE AND CONTINUOUS TIME SYSTEMS** 2.1 Discrete-Time Systems: Difference Equations, Natural/Forced/Total Response, Impulse Response 2.2 Convolution in Discrete-Time: Impulse Representation, Convolution Sum, Properties 2.3 System Properties: FIR/IIR, Causality, Stability, BIBO Criterion, Step Response 2.4 Continuous-Time Systems: Differential Equations, Natural/Forced/Total Response, Impulse Response 2.5 Convolution in Continuous-Time: Convolution Integral, Properties, Causality, Stability, Step Response Course Outcome: CO2, CO3, CO4, CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)

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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

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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

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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

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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

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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

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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

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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

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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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2. https://www.youtube.com/@IKS_Media./videos