GALGOTIAS UNIVERSITY

(Under the Uttar Pradesh Private Universities Act No. 12 of 2019)

COURSE BOOK - 2021
Volume-05

Curriculum and syllabus

2021-2024

University Polytechnic

Program: Diploma in Electronics & Communication Engineering

Diploma in Electronics & Communication Engineering

Vision: To be recognized as a center of excellence in Electronics and Communication Engineering for the global education and innovation to provide committed Diplomas who can apply knowledge and skills for the benefit of society.

Mission:

- To provide quality education by providing state of the art facility and solutions for global challenges.
- To provide framework for promoting the industry- institution collaboration and empower the students in interdisciplinary field.
- To transform students into socially responsible, ethical and technically proficient with innovative skills and usage of modern tools.
- To make the students corporate ready with spirit and necessary interpersonal skills

Program Educational Objectives

- Graduates will excel in their career by acquiring knowledge in the field of Electronics and Communication Engineering with the usage of modern tools and emerging technologies.
- Graduates will have the capability to analyze real life problems of the society and produce innovative solutions.
- Graduates exhibit professionalism, ethical attitude, communication skills and team work in core engineering through professional development and lifelong learning.

Program Specific Objectives

- PSO1: The ability to Apply the fundamental knowledge of electronics in various domain of analog & digital system with safety and environmental aspects.
- PSO2: Demonstrate and test electronics and communication systems for applications with real time constraints.

Program Outcomes

The students of Diploma in Electronics & Communication Engineering will have the ability

- Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.
- Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.

- Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.
- Engineering Tools: Apply appropriate technologies and tools with an understanding of the limitations.
- The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
- Environment and sustainability: Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- Individual and team work: Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
- Communication: An ability to communicate effectively.
- Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

Curriculum

Semester 1									
Sl.No.	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE1001	APPLIED PHYSICS-I	3	2	0	4	20	50	100
2	MATD1002	APPLIED MATHEMATICS-I	4	0	0	4	20	50	100
3	SLPC1003	PROFESSIONAL COMUNICATION-I	2	0	0	2	20	50	100
4	DPCS1004	COMPUTER FUNDAMENTALS	3	0	0	3	20	50	100
5	CHEM1005	BASIC CHEMISTRY	3	2	0	4	20	50	100
6	PHYE1006	APPLIED PHYSICS-I LAB	0	0	2	1	50	-	50
7	SLPC1007	PROFESSIONAL COMUNICATION-I LAB	0	0	4	2	50	-	50
8	DPCS1008	COMPUTER FUNDAMENTALS LAB	0	0	2	1	50	-	50
9	CHEM1009	BASIC CHEMISTRY LAB	0	0	4	2	50	-	50
		Total Credits	15	4	12	23			
Semester II									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	PHYE1010	APPLIED PHYSICS-II	3	2	0	4	20	50	100
2	MATD1011	APPLIED MATHEMATICS-II	4	2	0	5	20	50	100
3	SLPC1012	PROFESSIONAL COMUNICATION-II	3	0	0	3	20	50	100
4	DPEE1013	BASIC ELECTRICAL ENGG.	3	2	0	4	20	50	100
5	DPCO1014	ELECTRONIC COMPONETS & DEVICES	3	0	0	3	20	50	100
6	PHYE1015	APPLIED PHYSICS-II LAB	0	0	2	1	50		50
7	SLPC1016	PROFESSIONAL COMUNICATION-II LAB	0	0	4	2	50	-	50
8	DPME1017	WORKSHOP PRACTICE	0	0	6	3	50	-	50
9	DPEE1018	BASIC ELECTRICAL ENGG.LAB	0	0	2	1	50	-	50
10	DPCO1019	ELECTRONIC COMPONETS & DEVICES LAB	0	0	2	1	50	-	50
		TOTAL CREDITS	16	6	16	27			
Semester III									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MATD2001	APPLIED MATHEMATICS-III	3	2	0	4	20	50	100
2	DPCO2001	NETWORK FILTERS & TRANSMISSION LINES	3	0	0	3	20	50	100
3	DPCO2002	ELECTRONIC DEVICES AND CIRCUITS	3	0	0	3	20	50	100
4	DPCO2003	PRINCIPLES OF DIGITAL ELECTRONICS	3	0	0	3	20	50	100
5	DPCO2004	TECHNICAL DRAWING	2	0	0	2	20	50	100
6	DPME2018	ENGINEERING MECHANICS & MATERIAL	3	0	0	3	20	50	100
7	DPCO2005	NETWORK FILTERS & TRANSMISSION LINES LAB	0	0	2	1	50	-	50
8	DPCO2006	ELECTRONIC DEVICES AND CIRCUITS LAB	0	0	2	1	50	-	50
9	DPCO2007	PRINCIPLES OF DIGITAL ELECTRONICS LAB	0	0	2	1	50	-	50
10	EEDM2001	ENVIRONMENT EDUCATION & DISASTER MANAGEMENT	2	0	0	2	20	30	100
		Total Credits	19	2	6	23			

Semester IV									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPCO2008	PRINCIPLE OF COMMUNICATION ENGINEERING	3	0	0	3	20	50	100
2	DPCO2009	ANTENNA, MICROWAVE & RADAR ENGG.	3	0	0	3	20	50	100
3	DPCO2010	MICROPROCESSOR AND ITS APPLICATIONS	3	0	0	3	20	50	100
4	DPCS2015	COMPUTER PROGRAMMING AND APPLICATIONS	3	0	0	3	20	50	100
5	DPCO2011	ELECTRONIC INSTRUMENTS AND MEASUREMENT.	3	0	0	3	20	50	100
6	DPCO2012	PRINCIPLE OF COMMUNICATION ENGINEERING LAB	0	0	2	1	50	-	50
7	DPCO2013	ANTENNA, MICROWAVE & RADAR ENGG. LAB	0	0	2	1	50	-	50
8	DPCO2018	MICROPROCESSOR AND EMBEDDED SYSTEM LAB	0	0	2	1	50	-	50
9	DPCS2016	COMPUTER PROGRAMMING AND APPLICATIONS LAB	0	0	4	2	50	-	50
10	DPCO9001	DISRUPTIVE TECHNOLOGY	0	0	2	1	50		50
11	DPCO2019	ELECTRONIC INSTRUMENTS AND MEASUREMENT LAB	0	0	2	1	50	-	50
		Total Credits	15	0	14	22			
Semester V									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	IMED3001	INDUSTRIAL MANAGEMENT AND ENTERPRENURSHIP DEVELOPMENT	3	0	0	3	20	50	100
2	DPCO3002	MODERN COMMUNICATION SYSTEM	3	0	0	3	20	50	100
3	DPCO3003	INDUSTRIAL ELECTRONICS & TRANSDUCERS	3	0	0	3	20	50	100
4	DPCO3004	MICROELECTRONICS-I(ELECTIVE-I)	3	0	0	3	20	50	100
5	DPCO3005	BIO-MEDICAL ELECTRONICS (ELECTIVE SUBJECT-II)							
6	DPCO3007	MODERN COMMUNICATION SYSTEM LAB	0	0	2	1	50		50
7	DPCO3008	INDUSTRIAL ELECTRONICS & TRANSDUCERS LAB	0	0	2	1	50	-	50
8	PDSS3008	PERSONALITY DEVELOPMENT & SOFT SKILLS	0	0	4	2	50	-	50
9	DPCO9998	PROJECT-I	0	0	4	2	50	-	50
		Total Credits	12	0	12	18			
Semester VI									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	DPCO3009	FIELD VISIT AND PRESENTATION	0	0	0	2	50	-	50
2	DPCO9999	PROJECT-II	0	0	0	16	50	-	50
		Total Credits	0	0	0	18			

List of Electives

Basket-1

Sl No	Elective-1	Course Code	Name of the Electives	L	T	P	C
1		DPCO3004	MICROELECTRONICS	3	0	0	3

Basket-2

Sl No	Elective-2	Course Code	Name of the Elective	L	T	P	C
1		DPCO3005	BIOMEDICAL ELECTRONICS	3	0	0	3

Detailed Syllabus

Name of The Course	ELECTRONICS COMPONENTS & DEVICES			
Course Code	DPCO1014			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	0	3

Course Objectives

1. Understand the working of diodes, transistors.

2. Understand the application of different electronic devices and simple circuits.

3. To expose students to the function and application of the diodes, bipolar junction and field effect transistors in electronic circuits.

Course Outcomes

CO1	**Explain the basic electrical components like resistors, capacitors, inductors and diodes with its applications.**
CO2	**Design the rectifier, clipper and clamper circuits using diodes.**
CO3	**Illustrate the various special purpose diodes such as zener, schottky, varactor and photo diode.**
CO4	**Explain the BJT and its analysis as CE,CC and CB amplifier.**
CO5	**Develop the basic understanding of FET, MOSFET .**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: INTRODUCTION TO ELECTRONICS **9 Hours**
1.1. Application of Electronics in different fields. **1.2. Brief introduction to active components and devices.** **1.3. Introduction to passive components: Resister- Working characteristics/properties, Resistors- Carbon film, metal-film, carbon composition, wire wound and variable type (presets and potentiometers) constructional details, characteristics** **1.4. Capacitors- Working characteristics/properties, Capacitor's polyester, Metalized polyester, ceramic paper mica.** **1.5. Inductors, Transformers and RF coils- Working characteristics/properties Methods of manufacture of inductors, RF coils and small power and AF transformer and their testing. Properties of cores.**
Unit II: VOLTAGE AND CURRENT SOURCES **8 Hours**
Concept of constant voltage sources, symbol and graphical representation, characteristics of ideal and practical voltage sources. **Concept of constant current source, symbol and graphical representation, characteristics of ideal and practical current sources.** **Conversion of voltage source into a current source and vice-versa** **Concept of floating and grounded D.C. supplies.**

Unit III: SEMICONDUCTOR DIODE
10 Hours

P-N junction diode, Mechanism of current flow in P-N junction drift and diffusion currents, depletion layer, potential barrier, P-N junction diode characteristics, Zener& avalanche breakdown, concept of junction capacitance in forward & reverse bias conditions.

Semiconductor diode characteristics, dynamic resistance & their calculation from diode characteristics, dynamic resistance of diode in terms of diode current.

Diode (P-N junction) as rectifier, half wave rectifier full wave rectifier including bridge rectifier, Different types of diodes, characteristics and typical application of power diodes, Zener diodes, varactor diodes, point contact diodes, tunnel diodes, and LED's and photo diodes.

Important specifications of rectifier diode and Zener diode.

Unit IV: INTRODUCTION TO BIPOLAR TRANSISTOR AND ITS BIASING 6 Hours

Concept to bipolar transistor as a two junction three terminal device having two kinds of charge carriers, PNP and NPN transistors, their symbols and mechanisms of current flow,

CB, CE and CC configurations.

(a) Common base configuration (CB): inputs and output characteristics, determination of transistor parameters (input and output) dynamic resistance, current amplification factor.

(b) Common emitter configuration: current relations in CE configuration, collector current in terms of base current and leakage current (ICEO), relationship between the leakage current in CB and CE configuration, input and output characteristics, determination of dynamic input and output resistance and current amplification factor B from the characteristics.

(C) Common collector configuration:

Expression for emitter current in terms of base current and leakage current in CC configuration.

Comparison of CB and CE configuration with regards to dynamic input and output resistance, current gain and leakage current performance of CE configuration for low frequency voltage amplification. Typical application of CB configuration in amplification.

Transistor as an amplifier in CE configuration.

(a) DC load line, Its equation and drawing it on collector characteristics.

(b) Determination of small signal voltage and current gain of a basic transistor amplifier using CE output characteristic and DC load line, Concept of power gain as a product of voltage gain and current gain.

Different transistor biasing circuits for fixing the operating points, effect of temperature on operating point. Need and method for stabilization of operating point. Effect of fixing operating point in cut-off or saturation region on performance of amplifier.

Calculation of operating point for different biasing circuits, use of Thevenin's theorem in

analyzing potential divider biasing circuit. Simple design problems on potential divider biasing circuit.
Unit V: FIELD EFFECT TRANSISTOR (FET, MOSFET) 8 Hours
Construction, operation, characteristics and Biasing of Junction FET. Construction, operation, Characteristics and Biasing of MOSFET in both depletion and enhancement modes.

Suggested Reading

1. Thomas L. Floyd - Electronic Devices, 2-nd Ed, Merrill Publ.Co, Columbus-Ohio, 1988

2. Albert Paul Melvino - Electronic Principles, Tata McGraw-Hill, New Delphi, 1982

3. Stephan Santeria, Bruce Wedlock - Electronic Circuits and Applications, John Willey&Sons Inc. NY 1975

Name of The Course	**ELECTRONIC CIRCUITS AND DEVICES LAB**				
Course Code	**DPCO1019**				
Prerequisite					
Corequisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

Course Objectives: 1. Understand the working of resistors, capacitors, inductors, transformers, diodes, transistors.

2. Understand the application of different electronic devices and simple circuits.

Course Outcomes

CO1	**Test the basic electrical components like resistors, capacitors, inductors and diodes with its applications.**
CO2	**Design the rectifier, clipper and clamper circuits using diodes.**

Text Book (s):1. N.N.Bhargava, Kulshreshtha& Gupta - "Baisc Electronics & Linear Circuits" - Tata Mc.Graw-Hill.

Reference Book (s):1. Thomas L. Floyd - Electronic Devices, 2-nd Ed, Merrill Publ.Co, Columbus-Ohio, 1988

2.Albert Paul Malvino - Electronic Principles, Tata McGraw-Hill, New Delphi, 1982

Ex.1
Familiarization with lab instrument (Millimeter/CRO), etc.
Ex.2
Semiconductor diode characteristics: (i) Identifications of types of packages, terminals and noting different ratings using data books for various types of semiconductor diodes (Germanium, point contact, silicon low power and high power and switching diode). (ii) Plotting of forward V-I characteristics for a point contact and junction P-N diode (Silicon & Germanium diode).
Ex.3
Rectifier circuits using semiconductor diode, measurement of input and output voltage and plotting of input and output wave shapes (i) Half wave rectifier.

(ii) Full wave rectifier (center tapped and bridge rectifier circuits)
Ex.4
To Plot forward and reverse V-I characteristics for a Zener diode.
Ex.5
To Plot wave shapes of a full wave rectifier with shunt capacitor, series inductor and pi filter circuit.
Ex.6
To Plot the input and output characteristics and calculation of parameters of a transistor in common base configuration.
Ex.7
Transistor Biasing circuits **(i). Measurement of operating point (Ic&Vce) for a fixed bias circuit.** **(ii). Potential divider biasing circuits.** **(Measurement can be made by changing the transistor in the circuits by another of a same type number.**
Ex.8
Plot the FET characteristics and determination of its parameters from these characteristics.
Ex.9
To Plot input and output characteristics and calculation of parameters of a transistor in common emitter configuration
Ex.10
Measurement of voltage gain and plotting of the frequency response curve of a JFET amplifier circuits.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	**Network, Filters and Transmission Lines**			
Course Code	**DPCO2001**			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Objectives

1. To become familiar with propagation of signals through lines.

2. Calculation of various line parameters by conventional and graphical methods

3. Design of different types of filters, equalizer and attenuators.

Course Outcomes

CO1	**Demonstrate Network theorems.**
CO2	**Calculate various Network parameters by conventional methods.**
CO3	**Design of different types of attenuators and their analysis.**
CO4	**Design and analysis of different types of filters.**
CO5	**Apply knowledge of mathematics, science, and engineering in electromagnetic waves analysis**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: REVIEW OF NETWORK THEOREMS **8 Hours**

Review of the following, network theorem; superposition, Thevenin's Norton's and maximum power transfer.

Unit II: NETWORKS **8 Hours**

2.1 One Port Network: Series and parallel tuned circuit, expression for their impedance.

2.2 Two Port (Four Terminals Networks): Basic concept of the following terms:

(a) Symmetrical and asymmetrical networks.

(c) T-network, L Network, Bridge Network.

(d) Representation of a two port Network in terms of Z and H parameters.

Unit III: ATTENUATORS **6 Hours**

3.1 Units of attenuation (decibel and nepers)

3.2 General characteristics of attenuators.

3.3 Analysis and design of simple attenuator of following types

(a) Symmetrical T and n type.

(b) L type.

Unit IV: FILTERS **9 Hours**

4.1 Brief idea of the uses of filters networks in different communication system.

4.2 Connecting of low pass, high pass, band passes and band stop filters.

4.3 Theorem connecting attenuation constant a and characteristics impedance (Zo) determination of cut of frequency constant K section.

4.4 Prototype filter section

(a) T and n low pass filter section.

(b)Attenuation Vs frequency; phase shift Vs frequency characteristics impedance Vs frequency of T and n.

4.5Basic Concept of active filter and comparison with passive.

Unit V: TRANSMISSION LINE

16 Hours

5.1 Transmission lines and their application: Shapes of different types of transmission lines; including 300 ohm antenna feeder cable, 75 ohm co-axial cable, optical fiber cable, Also other different types of cables.

5.2 Distributed (or primary) constants of a transmission line equivalent circuit of infinite line;

5.3 Definition of characteristic impedance of line ; concept of short line termination in Zo currents no voltages long an infinite line; graphical representation; propagation constant, attenuation and phase shift constant of the line.

5.4 Relationship of characteristics impedance, propagation constant, attenuation constant and phase constant in term of distributed constants of the line.

5.5 Conditions for minimum distortion and minimum attenuation of signal on the line; necessity and different methods of loading the communication lines.

5.6 Concept of reflection and standing waves on a transmission line; definition of reflection coefficient in terms of characteristics

impedance and load impedance; Definition of standing wave ratio (SWR), relation between VSWR and voltage reflection coefficient, maximum impedance on a line in term of characteristics impedance and VWSR. **5.7 Transmission line equation; expression for voltage, current and impedance at a point on the lines for lines with and without losses. Expression for the input impedance of the line.** **5.8 Input impedance of an open and short-circuited line and its graphical representation.**

Suggested Reading

1. A. Chakravorty- An Introduction to Network, Filters &Transmission Line- Dhanpatrai& Co.

2. J. P. Ryder-Network Filters & Transmission Line- PHI

3. Principles of Electromagnetics - Mathew N.O. Sadiku

4. V. K. Aatre- Network Theory & Filter Design-New AgeInternational Pub.

Name of The Course	**NETWORK FILTERS AND TRANSMISSION LINES LAB**				
Course Code	**DPCO2005**				
Prerequisite					
Corequisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

Course Objectives:1. To become familiar with propagation of signals through lines

2. Calculation of various line parameters by conventional and graphical methods

3. Design of different types of filters, equalizer and attenuators.

Course Outcomes

CO1	**Demonstrate Network theorems.**
CO2	**Calculate various line parameters by conventional methods.**
CO3	**Design of different types of filters, equalizer and attenuators.**

Text Book (s):1. A. Chakravorty- An Introduction to Network, Filters &Transmission Line- Dhanpatrai& Co.

Reference Book (s):1.D. R. Chaudhry- Network Analysis-DhanpatRai& Co.

2.V. K. Aatre- Network Theory & Filter Design-New AgeInternational Pub.

Ex.1
Experimental verifications of the Thevenin' s and Norton' s theorem with an a.c. source.
Ex.2
To measure the characteristics impedance of a symmetrical T/Π (pi) network.
Ex.3
To design and measure the attenuation of a symmetrical T/Π(pi) type attenuator.
Ex.4
Determine the characteristics impedance of a prototype low pass filter.
Ex.5

Determine the characteristics impedance of a prototype high pass filter.
Ex.6
To plot the impedance characteristic of a prototype band pass filter.
Ex.7
Measurement of L & C of lossless transmission line.
Ex.8
Measurement of characteristics of a short transmission line.
Ex.9
Measurement of Zo of lossless transmission line.
Ex.10
Measurement of Attenuation of lossless transmission line.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	**Electronic Devices and Circuits**				
Course Code	**DPCO2002**				
Prerequisite	**DPCO1014**				
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

1. Understand the working of diodes, transistors.

2. Understand the application of different electronic devices and simple circuits.

3. To expose students to the function and application of the diodes, bipolar junction and field effect transistors in electronic circuits

Course Outcomes

CO1	**Discuss Multistage Transistor Amplifier**
CO2	**Develop the understanding of power amplifiers.**
CO3	**Analyse different types of Feedback amplifier**
CO4	**Discuss Tuned voltage Amplifier.**
CO5	**Design Multi vibrators & Sinusoidal Oscillator Circuits.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: MULTISTAGE TRANSISTOR AMPLIFIERS 6 Hours
1.1 Need of multistage amplifier, different coupling schemes and their working, brief mention of application of each of the type of coupling.
1.2 Working of R.C. coupled and transformer coupled multistage amplifier, approximate calculation of voltage gain for a two stage R-C coupled amplifier.
1.3 Frequency response of R-C coupled and transformer coupled amplifiers and its

physical explanation, definition and physical significance of the term as bandwidth, upper and lower cross over frequencies etc.

1.4 Direct coupled amplifier and its limitations, differential amplifier typical circuits diagram and its working.

Unit II: TRANSISTOR AUDIO POWER AMPLIFIERS 8 Hours

2.1 Difference between voltage and power amplifier, importance of impedance matching in power amplifier, collector efficiency of power amplifier.

2.2 Typical single ended power amplifier and its working, graphical method for calculation of output power, heat dissipation curve and importance of heat, sinks, class A, class B, class C amplifier (without derivation).

2.3 Working principle of push pull amplifier and circuits, its advantages over single ended power amplifier, cross over distortion in class B operation and its reduction, different driver stages for push pull amplifier circuit.

2.4 Working principle of complementary symmetry push pull circuit and its advantages.

2.5 Boot strap technique in amplifiers.

2.6 Transformer less audio power amplifiers and their typical application.

2.7 Mention of at least one popular IC with its block diagram, Pin configuration and it working of each type of power amplifier.

Unit III: FEED BACK AMPLIFIERS 6 Hours

3.1 Basic principle and types of feedback.

3.2 Effect of negative feedback on gain, stability, distortion and band width (Only physical explanation)

3.3 Typical feedback circuits:

(a) A.C. coupled amplifiers with emitter by-pass, capacitor removed.

(b) Emitter follower and its application, simple mathematical analysis for voltage gain and input impedance of above circuits.

Unit IV: TUNED VOLTAGE AMPLIFIERS 5 Hours

4.1 Classification of amplifiers on the basis of frequency.

4.2 Review of basis characteristics of tuned circuits, (Series and Parallel)

4.3 Single and Double tuned amplifier, their working principles and frequency response (no mathematical derivation). Concepts of neutralization.

4.4 Staggered tuned amplifier and typical applications in brief.

4.5 Mention of at least one popular IC with its block diagram, Pin configuration and it working of each type of Tuned amplifier.

Unit V: SINUSOIDAL OSCILLATORS 10 Hours

5.1 Application of oscillators.

5.2 Use of positive feedback/negative resistance for generation of oscillation, barkhausen's criterion for oscillations.

5.3 Different oscillators circuits, tuned collector, Hartley, Colpitts, phase shift, Wien's bridge and crystal oscillator and their working principles (no mathematical derivation).

5.4 Mention of at least one popular IC with its block diagram, Pin configuration and it working of each type of oscillators.

5.5 Ideal transistor switch; explanation using C.E. output characteristics, calculation of component values (collector and base resistors) for a practical transistor switch. **5.6 Transistor switching time. Use of speed up capacitor (Physical explanation).** **5.7 Basic concept of working of collector coupled bistable, monostable and stable multivibrator circuits including principle of triggering.** **5.8 Operation of Schmitt trigger, calculation of upper trigger potential (UTP) and lower trigger potential (LTP).** **5.9 Mention of applications of multivibrators and Schmitt trigger. Its use as waveform generator.**

Suggested Reading

1. Thomas L. Floyd - Electronic Devices, 2-nd Ed, Merrill Publ.Co, Columbus-Ohio, 1988

2. Albert Paul Malvino - Electronic Principles, Tata McGraw-Hill, New Delphi, 1982

3. Stephan Senturia, Bruce Wedlock - Electronic Circuits and Applications, John Willey&Sons Inc. NY 1975

Name of The Course	**ELECTRONIC DEVICES AND CIRCUITS LAB**				
Course Code	**DPCO2006**				
Prerequisite					
Corequisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

Course Objectives:1. Understand the working of diodes, transistors.

2. Understand the application of different electronic devices and simple circuits.

3.To expose students to the function and application of the diodes, bipolar junction and field

effect transistors in electronic circuits.

Course Outcomes

CO1	**Develop the understanding of power amplifiers and tuned voltage amplifiers.**
CO2	**Analyze different types of oscillators and wave shaping circuits.**
CO3	**Design Multi vibrators & OP-AMP Circuits.**

Text Book (s):1. N.N.Bhargava, Kulshreshtha& Gupta - "Baisc Electronics & Linear Circuits" - Tata Mc.Graw-Hill.

Reference Book (s):1. N.N. Bhargava, Kulshreshtha& Gupta - "Baisc Electronics & Linear Circuits" - Tata Mc.Graw-Hill.

2.Albert Paul Malvino - Electronic Principles, Tata McGraw-Hill, New Delphi, 1982

Ex.1
To measure the overall gain of two stage R.C. coupled amplifier at 1 Khz and note the effect of loading of second stage on the first stage
Ex.2
To plot the frequency response of R-C coupled amplifier

Ex.3
(a) To plot the load Vs output power characteristics to determine the maximum signal input for undistorted signal output. **(b) The above experiment is to be performed with single ended power amplifier; Transistorized push; pull amplifier; Complementary Symmetry power Amplifier**
Ex.4
To observe the effect of a by-pass capacitor by measuring voltage gain and plotting of frequency response for a single stage amplifier
Ex.5
Measurement of voltage gain input and output impedance and plotting of frequency response of an emitter follower circuit.
Ex.6
Measurement of resonant frequency, plotting of the response curve (i.e., graph between input frequency and impedance) and calculation of Q with the help of this curve for series and parallel resonant circuit.
Ex.7
measure the frequency response of a single stage tuned voltage amplifier and calculation of the Q of the tuned circuit load
Ex.8
Observe and plot the output wave shapes of; **(a) R-C differentiating circuits.** **(b) R-C integrating circuits for square wave input (Observe the effect of R-C time constant of the circuits on the output wave shape for both the circuits).**
Ex.9
Identification, Pin configuration and basic working of different popular IC's - Ex.- Power amplifier, Oscillator, Tuned amplifier, Multivibrator, Timer.
Ex.10
Use of Op-Amp. (for IC-741) as Inverting and non-inverting amplifier, adder, comparator, buffer, scale changer.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	**Principle of Digital Electronics**			
Course Code	**DPCO2003**			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Objectives

1.To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

2.To prepare students to perform the analysis and design of various digital electronic circuits.

3. To understand number representation and conversion between different representation in digital electronic circuits.

4. To analyze logic processes and implement logical operations using combinational logic circuits

Course Outcomes

CO1	**Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.**
CO2	**The ability to understand, analyze and design half adder and full adder circuit.**
CO3	**To understand and examine the structure of various number systems and its application in digital design.**
CO4	**The ability to understand, analyze and design various combinational and sequential circuits.**
CO5	**To develop skill to build, and troubleshoot digital circuits.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Number System	**8 Hours**
1.1 Basic difference between analog and digital signal. **1.2 Application and advantages of digital and analog signal.** **1.3 Binary, Octal and Hexadecimal number system; conversion from decimal octal and hexadecimal to binary and vice-versa.** **1.4 Binary addition, subtraction, multiplication and division including binary points.1's and 2's complements method of subtraction, Boolean Algebra.** **1.5 Gray code, Gray to binary conversion and vice-versa, 8421 and excess-3 codes; mention of other popular BCD codes**	
Unit II:Logic Gates	**6 Hours**
2.1 Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates. **2.2 Use of NAND and NOR gates as universal gates.** **2.3 Design of Half adder and Half subtractor.** **2.4 Design of Full adder circuits and its operation.**	
Unit III: Logic Simplification	**6 Hours**
3.1 Boolean algebra, Karnaugh-mapping (up to 4 variables) and simple application in developing combinational logic circuits. **3.2 Implementation of logic equations with gates.**	
Unit IV: Combinational Circuits	**6 Hours**
4.1 LED, LCD, seven segment display, basic operation of various commonly used types. **4.2 Four Decoder circuits for 7 segment display.** **4.3 Basic decimal to BCD encoder circuits.** **4.4 Use of decoders/driver ICs with reference to commercial ICs.** **4.5 Basic Multiplexer and Demultiplexer**	
Unit V: Sequential Circuits	**10 Hours**
5.1 Latches, flip Flop, Clock Pulse, triggering techniques **5.2 Operation using waveforms and truth tables of following flipflops. RS, T, RST, D, JK, Master/Slave JK Flip Flops mention of commonly used ICs Flip flops.** **5.3 Basics of Counters, Ring counter.**	

5.4 Introduction and Basic concepts including shift left and shift right. Serial in serial out, Serial in parallel out, Parallel in serial out, Parallel in parallel out. **5.5. Semi-conductor ROMs, PROMs, EPROM, SRAM, DRAM, Basic structure and working of CCD, R/W memory.**

School of Suggested Reading

1.Malvino& Leach- Digital Principles & Application- Mcgraw Hill- 5th Edition.

2.Mano, M. Morris- Digital Logic and Computer Design- Prentic Hall (India).

3.Digital Electronics by S.Salivahan.

4.Digital Fundamentals by Floyd.

Name of The Course	**PRINCIPLES OF DIGITAL ELECTRONICS LAB**				
Course Code	**DPCO2007**				
Prerequisite					
Corequisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

Course Objectives:1. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

2. To prepare students to perform the analysis and design of various digital electronic circuits.

Course Outcomes

CO1	**Design combinational circuits.**
CO2	**Develop the understanding of various synchronous and asynchronous sequential circuits.**

Text Book (s):1. Malvino& Leach- Digital Principles & Application- Mcgraw Hill- 5th Edition.

Reference Book (s):1. Digital Electronics by S.Salivahan.

2.Digital Fundamentals by Floyd.

Ex.1
Identification of Ic-nos, Pin-nos, Ic types.
Ex.2
Familiarization with TTL And MOS ICs.
Ex.3
To observe that logic low and logic high of logic gate.
Ex.4
To observe the propagation delay of TTL logic gate.
Ex.5
Observation of the difference between MOS and TTL gates under the following heads **(a) Logic levels.** **(b) Operating voltages.** **(c) Propagation delay.**
Ex.6
Familiarization and use different types of LEDs common anode and common cathode seven segment display.
Ex.7
Use of 7447 BCD to 7-segment decoder.
Ex.8

Verification of truth table for 2 Input NOT, AND, OR, NAND, NOR, XOR Gates. Design and Implementation Of Simple Logic Circuits.
Ex.9
To construct a 4-bit even/odd parity generator/checker using XOR gates and to verify their truth tables.
Ex.10
To construct half adder and half subtract or using XOR and NAND gates verification of their truth tables.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	**Technical Drawing**				
Course Code	**DPCO2004**				
Prerequisite					
Co-requisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	2	**0**	**0**	**2**	

Course Outcomes

CO1	**Use the techniques and able to interpret the drawing in Engineering field**
CO2	**Interpret engineering drawings using fundamental technical mathematics**
CO3	**Construct basic and intermediate geometry products**
CO4	**Develop their visualization skills so that they can apply these skills in developing new products**
CO5	**Draw two-dimensional orthographic drawings and three-dimensional isometric views**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
30	20	50	100

Course Content:

Unit I: STANDARD SYMBOLS OF PASSIVE DEVICES. 3 hours
1.1 Resistors Capacitors: Fixed, preset, variable, electrolytic and ganged types. **1.2 Inductors: Fixed, tapped and variable types, RF & AF chokes, Air cored, Solid cored &laminated cored.** **1.3 Transformers: Step-up, step-down. AF & RF types, Auto-transformer, IF transformer. Antenna, Chassis, Earth, Loudspeaker, Microphone, Fuse Indicating lamp, Coaxial cable, Switches-double pole single throw (DPST), Double pole throw (DPT) and Rotary types terminal and connection of conductors.**
Unit II: ACTIVE DEVICES 5 Hours
Semiconductor: Rectifier diode, Zener diode, Varactor diode, Tunnel diode, Photo, Light emitting diode (LED), Bipolar transistor, junction field effect transistor (JFET), Mosfet, Photo transistor, Uni junction transistor (UTJ), Silicon control rectifier (SCR), Diac, Triacs outlines

(with their types numbers e.g., TO3, TO5, TO18, TO39, TO65 etc.) of the different types of semiconductor diodes, Transistors Scrs, Diacs, Triacs and ICs (along with indicators for pin identification etc.)
Unit III: COMMUNICATION INSTRUMENTS 2 Hours
Telephone Transmitter, Receiver, Filters & Hybrid transformer
Unit IV: LOGIC GATES 4 Hours
Draw standard symbols of NOT, AND, NAND, OR, NOR XOR, Expandable & Tristate gates, Op Amp IC, Flip-flops (Combination of 2,3,4 input gates should be drawn).
Unit V: SKETCHES/CIRCUIT DIAGRAMS 8 Hours
5.1 Circuit diagram of a Wein's bridge oscillator. **5.2 Circuit diagram of a Battery eliminator.** **5.3 Block diagram of a typical Radio receiver.** **5.4 Block diagram of an Electronic multimeter.** **5.5 Circuit of Emergency light.** **5.6 Circuit diagram of Voltage stabilizers.** **5.7 Circuit diagram of Fan regulator.** **5.8 Schematic Diagram of electrical & Electronic CKT.**

Suggested Reading

1.Jensen, Cecil. H , Engineering Drawing and Design, New York: McGraw-Hill

2. Basic Engineering Drawing by R.S. Rhodes & L.B. Cook

3. Electronics Engineering Drawing Book,A.K Mittal

Name of The Course	**ENGG. MECHANICS & MATERIALS**				
Course Code	**DPME2018**				
Prerequisite					
Co-requisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	3	**0**	**0**	**3**	

Course Objectives

1. Understand the basics of engineering mechanics and forces

2. Understand the laws of forces and their concept

3. compare and relate the stress and strain and properties of materials electronic circuits

Course Outcomes

CO1	**Recognize and analyse basic theory and principles of forces in mechanics and their relationship to engineering**
CO2	**Describe the resultant forces (combination of forces) and laws of forces**
CO3	**Describe and understand the rigid body concept and moment.**
CO4	**Calculate and Understand the concept of stress and strain and torsion**
CO5	**Differentiate different material properties and welding, soldering, brazing techniques**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Introduction **6 Hours**
Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.
Unit II: Forces Analysis **8 Hours**
Concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplanar concurrent force system.
Unit III: General Condition of Equilibrium 10 Hours
General condition of equilibrium of a rigid body under the action of coplanar forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.
Unit IV: Stresses and strains 10 Hours
Concept of stress and strain. Concept of various types of stresses and strains. Definitions of tension, compression shear, bending, torsion. Concept of volumetric and lateral strains, Poisson's ratio. Mechanical properties of MS, SS, CI Al and etc.
Unit V: (A) Materials & Concept Used in Electronics & (B) Soldering & Brazing: 10 Hours
Soldering materials - Type, chemical composition and properties, Soldering alloys - Tin lead, Tin antimony, Tin silver, Lead silver, Tin zinc, Different types of flux and their properties, Properties of plastics materials, Epoxy materials for PCB (Single and multi-layer board), Emulsion parameters, Film emulsion, Type of laminates (Phenolic, Epoxy, Polyester, Silicon, Melamine, Polyamide), Properties of copper clad laminates, Material (Filler, Resin, Copper Foil) Photo printing basic for double side PCB, Photo resin materials coating process materials, Screen printing and its materials Etching agent, Film processing and used materials. For black Galvanized and Tin coated Iron sheet, brass and copper sheets only. **(1) Its concept, comparison with welding as joining method and classification, electric soldering and forge soldering.** **(2) Soldering operation- edge preparation of joints, Pickling and degreasing, Fluxing, Tinning and Soldering. Wave soldering, solder mask, Dip soldering, Drag soldering,**

(3) Materials Used-Common fluxes, soft and hard solder, solder wire (Plain and Resin core) and sticks, spelters and their specifications and description (For Identification Only), forge soldering bits. **(4) Electric soldering iron, other soldering tools.** **(5) Common defects likely to occur during and after soldering.** **(6) Safety of Personnel, Equipment & Tools to be observed.**

Suggested Reading

1. Karmveer, 'Engineering Mechanics and Material,First edition:2016,A unit of Krishna Group, I.S.B.N. No.:978-81-8283-860-4

2. Dr.P.C.Sharma, 'Production technology', (Manufacturing Processes)

Name of The Course	**Principles of Communication Engineering**				
Course Code	**DPCO2008**				
Prerequisite					
Co-requisite					
Anti-requisite					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

1 Develop and compare the functional blocks of coding/modulation and demodulation/decoding for analog and digital communication systems.

2. Analyze the analog-to-digital conversion process with emphasis on Nyquist Sampling Criteria, pulse shaping and optimum detection functions

3. Student understand the basic signals and systems

Course Outcomes

CO1	**Illustrate the basic of analog communication.**
CO2	**Develop understanding about AM transmission and reception**
CO3	**Explain about FM and PM transmission and reception**
CO4	**Analyse different characteristics of pulse modulation**
CO5	**Identify different types of noise and predict its effect on various analog communication systems.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	**30**	**50**	**100**

Course Content:

Unit I: Introduction 2 Hours
Need for modulation and demodulation in communication systems.) Basic scheme of modern communication system.
Unit II: AMPLITUDE MODULATION 8 Hours
(a) Derivation of mathematical expression for an amplitude modulated wave showing Carrier and side band components. **(b) Significance of Modulation index, spectrum and bandwidth of AM wave, relative power distribution in carrier and sidebands.** **PRINCIPLE OF AM MODULATORS-**

Working principles and typical applications of

(a) Collector Modulator

(b) Balanced Modulator

DEMODULATION OF AM WAVES-

(a) Principles of demodulation of AM wave using diode detector circuit, concept of diagonal clipping and formula for minimum distortion (No derivation).

(b) Principle of demodulation of AM wave using synchronous detection

(c) Elementary idea of DSB-FC, DSB-SC, SSB-SC, ISB and VSB modulations, their comparison and areas of applications

Unit III: FREQUENCY MODULATION 10 Hours

(a) Derivation of expression for frequency modulated wave and its frequency spectrum (without proof and analysis of Bessel function), modulation index, maximum frequency deviation and deviation ratio, BW of FM signals, Carlson's rule.

(b) Effect of noise on FM carrier, noise triangle, need for pre-emphasis and de-emphasis, capture effect.

(c) Comparison of FM and AM communication system.

PRINCIPLES OF FM MODULATORS-(a) Working principles and applications of reactance modulator, VCO and Armstrong phase modulator, stabilization of carrier using AFC.

(b) Block diagram and working principles of reactance transistor and Armstrong FM transmitters DEMODULATION OF FM WAVES-(a) Basic principles of FM detection using slope detector.

Principles & working of the following FM demodulators.Ratio Detector,Phase Locked Loop (PLL) FM Detector

Unit IV: PHASE MODULATION 10 Hours

Derivation of expression for phase modulated wave, modulation index, comparison with frequency modulation

(a) Working principles and applications of reactance modulator, VCO and Armstrong phase modulator, stabilization of carrier using AFC.

(b) Block diagram and working principles of reactance transistor and Armstrong FM transmitters

Project Based Learning: digital data transmission system.

Unit V: MULTIPLEXING TECHNIQUE 10 Hours

(a) Statement of sampling theorem and elementary idea of sampling frequency for pulse modulation.

(b) Basic concepts of time division multiplexing (TDM) and frequency division multiplexing (FDM).

(c) Basic ideas about PAM, PPM, PWM and their typical applications.

(d) Basic Block diagram and working principle of ASK, PSK, FSK & QPSK

Suggested Reading

1. "Introduction to Analog & Digital Communication Systems", "Haykin Simon", John Wile

2. B.P.Lathi, "Digital and analog communication system", international 4th Edition, OXFORD university press, ISBN : 0195110099, 9780195110098

Name of The Course	**PRINCIPLES OF COMMUNICATION ENGG. LAB**				
Course Code	**DPCO2012**				
Prerequisite					
Corequisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

Course Objectives:1. Develop and compare the functional blocks of coding/modulation and demodulation/decoding for analog and digital communication systems.
2. Analyze the analog-to-digital conversion process with emphasis on Nyquist Sampling Criteria, pulse shaping and optimum detection functions

Course Outcomes

CO1	**Develop understanding about AM transmission and reception.**
CO2	**Demonstrate FM and PM transmission and reception.**
CO3	**Analyze different characteristics of pulse modulation.**

Text Book (s):1. "Introduction to Analog& Digital Communication Systems", "Haykin Simon", John Wile
Reference Book (s):1.B.P.Lathi, "Digital and analog communication system", international 4th Edition, OXFORD university press, ISBN : 0195110099, 9780195110098
2.Kennedy" Electronic Communications" McGraw Hill Publication, ISBN-13:978-0-07-463682-4; ISBN-10:0-07-463682-0

Ex.1
(a) To conserve an AM wave on CRO produced by a standard signal generator using internal and external modulation. (b) To measure the modulation index of the wave obtained in above practical.
Ex.2
a) To obtain an AM wave from a collector modulator circuit and observe the AM pattern on CRO. **(b) To measure index of modulation of the AM signal for different levels of modulating signal.**
Ex.3
To obtain a FM wave from reactance tube modulator/voltage-controlled oscillator circuit and measure the frequency deviation for different modulating signals
Ex.4
To obtain modulating signal from an AM detector circuit and observe the pattern for different RC time constants and obtain its optimum value for least distortion.
Ex.5

To obtain modulating signal from a FM detector (Foster Seely/Ratio detector/quadrature/IC) circuit and plot the discriminator characteristics.
Ex.6
To observe the sampled signal and compare it with the analog input signal. Note the effect of varying the sampling pulse width and frequency on the sampled output
Ex.7
To verify the sampling theorem.
Ex.8
To time division multiplex the two given signals.
Ex.9
To measure the quantization noise in a 3 bit/4-bit coded PCM signal.
Ex.10
To study the process of delta modulation/demodulation.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	**Antenna, Microwave & Radar Engineering**				
Course Code	**DPCO2009**				
Prerequisite	**DPCO2001**				
Co-requisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	3	**0**	**0**	**3**	

Course Objectives

1. To understand Analysis of Waveguides and gain complete knowledge about Microwave Components.

2. Design of Impedance Matching and Tuning using lumped and distributed elements for network

3. To Analysis and study characteristics of microwave tube

Generators and Amplifiers.

Course Outcomes

CO1	**Identify basic antenna parameters**
CO2	**Design and analyse wire, aperture and microstrip antennas**
CO3	**Explain various antenna measurements**
CO4	**Analyse and measure different microwave components.**
CO5	**Identify characteristics of radio wave propagation.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Introduction	**2 Hours**
Antenna as an element of wireless communication system, Types of antennas Antenna parameters: Radiation pattern (polarization pattern, Field and phase pattern), Radiation intensity, Beam width, Gain, Directivity, Polarization, Bandwidth,	

Efficiency, Effective height, Effective aperture of different antenna
Unit II: ANTENNA AS A TRANSMITTER AND RECEIVER 8 Hours
Power delivered to antenna as a receiver, Input impedance and firs transmission equation, Properties of uniform plane waves, Radiation from an infinitesimal small current element, Radiation from an elementary dipole (Hertzian dipole), Power density and radiation resistance for small current element and half wave dipole
Unit III: MICROSTRIP ANTENNAS 10 Hours
Microstrip Antennas & their advantages, Rectangular Patch, Circular Patch, Quality Factor, Bandwidth, and Efficiency, Transmission Line model analysis of Microstrip Antenna. Dielectric effect, Dielectric Loss Tangent- tan δ
Unit IV: MICROWAVE 10 Hours
Introduction to microwave and its applications, classification on the basis of its frequency band according ITU standards. Construction, Operating Principles, Performance characteristics and Applications of the following - (a) Microwave Tubes- Multi-cavity Klystron, Multi-cavity Magnetron, Reflex Klystron, Travelling wave tube and BWO. (b) Microwave Semiconductor Devices - PIN, Tunnel Diode, IMPATT and TRAPATT and Gun diode (in brief only) Different types of waveguides and their applications. Propagation constant of a rectangular waveguide, cut off wavelength, guide wavelength. (No Mathematical Derivation), Microwave components-Tees, Bends, Matched termination, Detector mount, Slotted section, directional coupler, Circulator and duplexer-their constructional features characteristics and application.
Unit V: RADAR SYSTEMS 8 Hours
Introduction to Radar, its various application. Radar range equation (No Derivation) and its application **Block diagram and operating principle of basic pulse radar** **Block diagram, operating principle of CW (Doppler) and FMCW radars and their application.** **Project based learning: Working model of a Radar System**

Suggested Reading

1. "Antennas and Radio Propagation, Collins, R. E, McGraw-Hill,1987

2. Antennas, Kraus and RonalatoryMarhefka, John D., Tata McGraw-Hill, 2002

Name of The Course	**ANTENNA, MICROWAVE & RADAR ENGG. LAB**				
Course Code	**DPCO2013**				
Prerequisite	**DPCO2005**				
Corequisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

Course Objectives:1. To understand Analysis of Waveguides and gain complete knowledge about Microwave Components.

2. Design of Impedance Matching and Tuning using lumped and distributed elements for network

Course Outcomes

CO1	**Identify basic antenna parameters**
CO2	**Design and analyze wire, aperture and microstrip antennas**
CO3	**Determine various antenna measurements**

Text Book (s):1. Antenna Theory, Ballanis, John Wiley & Sons, 2003

Reference Book (s): Antennas and Radio Propagation, Collins, R. E, McGraw-Hill,1987.

List of Experiments
Ex.1
Study radiation pattern of any two types of linear antenna
Ex.2
Study of waveguide horn and its radiation pattern and determination of the beam width.
Ex.3
To study working of MIC Components like Micro strip Line, Filter, Directional Coupler, Wilkinson Power Divider, Ring resonator & coupler, antennas & amplifies.
Ex.4
Measurement of impedance of an unknown load connected at the output end of the slotted line carriage in a Micro wave Bench.
Ex.5
Measurement of guide wavelength and frequency of the signal in a rectangular Waveguide using slotted line carriage in a Micro wave Bench.
Ex.6
Study various parameters of Isolator.
Ex.7
Measurement of attenuation of a attenuator and isolation, insertion loss, cross coupling of a circulator.
Ex.8
Determine the S-parameter of a Magic Tee.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50	**-**	**50**	**100**

Name of The Course	**Microprocessor and its Applications**				
Course Code	**DPCO2010**				
Prerequisite					
Co-requisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	3	**0**	**0**	**3**	

Course Objectives

1. To understand basic architecture of 16 bit and 32-bit microprocessors

2. Develop worst-case execution time of programs programs, to maximize its run time memory or execution-time.

Course Outcomes

CO1	**Develop assembly language programs of moderate complexity.**
CO2	**Identify an appropriate 'architecture' or program design to apply to a particular situation.**
CO3	**Develop worst-case execution time of programs programs, to maximize its run time memory or execution-time.**
CO4	**Explain the effects of the properties of the bus on the overall performance of a system.**
CO5	**Compare the characteristics of RISC and CISC architectures.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: OVERVIEW OF MICROCOMPUTERS SYSTEM **8 Hours**
1.1 Functional block. (a) CPU. **(b) Memory.** **(c) Input/Out devices (Key board, Floppy drive, Hard disk drive, Tape drive, VDU, Printer, Plotter).** **1.2 Concept of programme and data memory.** **(a) Registers (general purpose).** **(b) External memory for storing data and results.** **1.3 Data transfer between registers.** **1.4 Concept of tristate bus.** **1.5 Control on registers.**

Unit II: MEMORY OF A MICROCOMPUTER **8 Hours**
2.1 Concept of byte organized memory. **(a) Address inputs.** **(b) Address space.** **(c) Data input/output.** **2.2 Addressing and Address decoding.** **(a) Memory system organization.** **(b) Partitioning of total memory space into small blocks.** **(c) Bus contention and how to avoid it.** **2.3 Memory chips.** **(a) Types of ROM, RAM, EPROM, PROM.** **(b) Read/Write inputs.** **(c) Chip enable/select input.** **(d) Other control input/output signals.** **- Address latching.** **- Read output.** **- Address strobes.** **(f) Power supply inputs.** **2.4 Extension of memory.** **- In terms of word length and depth**
Unit III: C P U AND CONTROL 10 Hours
3.1 General microprocessor architecture. **3.1 Instruction pointer and instruction register.** **3.2 Instruction format, Machine and Mnemonics codes, Machine and Assembly language.** **3.3 Instruction decoder and control action.** **3.4 Use of Arithmetic Logic Unit.** **- Accumulator.** **- Temporary Register.** **- Flag flip-flop to indicate overflow, underflow, and zero result occurrences.**

3.5 Timing and control circuit. **- Crystal and frequency range for CPU operation.** **- Control bus to control peripherals.**
Unit IV: ASSEMBLY LANGUAGE PROGRAMMING 10 Hours
4.1Evolution of Microprocessor, Internal organization of 8085 **4.2Register Structure, ALU, BUS Organization** **4.3Timing and Control, Pin Diagram of 8085** **4.4 internal organization of 8086, Bus Interface Unit, Execution Unit, Unit, register, Organization.** **4.5Sequential Memory Organization, Bus Cycle, Pin Diagram of 8086. Addressing Modes.** **4.6 Data Transfer, Instructions, Arithmetic and Logic Instruction, Program Control Instructions (Jumps, Conditional Jumps, Subroutine Call) Loop and String Instructions, Assembler Directives.**
Unit V:MICRO CONTROLLERS 8 Hour
5.1Brief idea of Microcontroller 8051 **5.2Pentium and Power PC** **5.3MEMORY INTERFACING** **5.4Types of Memory, RAM and ROM Interfacing with Timing Considerations, DRAM Interfacing**

Suggested Reading

1. A.K.Ray and K.M.Bhurchandi, "Advanced Microprocessors and Peripherals", Tata

2. Muhammad Ali Mazidi and Janice Gillispie Mazidi, "The 8051 – Microcontroller and Embedded systems",7th Edition, Pearson Education, 2004.

Name of The Course	**MICROPROCESSOR AND ITS APPLICATIONS LAB**			
Course Code	**DPCO2014**			
Prerequisite				
Corequisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	**0**	**2**	**1**

Course Objectives:1. To understand basic architecture of 16 bit and 32-bit microprocessors.

2. To understand interfacing of 8-bit microprocessor with memory and peripheral chips involving

system design.

Course Outcomes

CO1	**Develop assembly language programs of moderate complexity.**
CO2	**Develop worst-case execution time of programs programs, to maximize its run time memory or execution-time.**
CO3	**Identify an appropriate 'architecture' or program design to apply to a particular situation.**

Text Book (s):1. A.K.Ray and K.M.Bhurchandi, "Advanced Microprocessors and Peripherals",Tata McGrawHill,2000.

Reference Book (s):1. Ramesh S. Gaonkar, "Microprocessor & its Applications.

2.Doughlas.V. Hall, "Microprocessor and Interfacing: Programming and Hardware", 2nd edition, McGraw Hill, 1991.

Ex.1
Addition of two 8-bit numbers
Ex.2
(a) To obtain 2's complement of 8-bit number (b) To subtract a 8 bit number from another 8 bit number using 2's Complement
Ex.3
Extract fifth bit of a number in A and store it in another register.
Ex.4
Count the number of bits in high state in accumulator
Ex.5
Check even parity and odd parity of a binary number
Ex.6
Addition of two sixteen-bit numbers
Ex.7
Subtraction of a sixteen-bit number from another sixteen-bit number
Ex.8
Multiplication of two 8-bit numbers by repetitive subtraction
Ex.9
Divide two 8-bit numbers by repetitive subtraction
Ex.10
(a) Smallest number of three numbers. (b) Largest number of three numbers

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Electronic Instruments & Measurements			
Course Code	DPCO2011			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	0	3

Course Objectives

1. Understanding the requirements to generate electronic signals.
2. Discussing different techniques to stabilize strength and frequency.
3. Understanding different techniques to measure frequency.

Course Outcomes

CO1	Develop skill of mustimeters, voltmeters, ammeters, CRO for electronics projects. Review basics of Measurements.
CO2	Design a system, component or process to meet desired needs in electronics engineering. Study of various measuring instruments and devices. 3. Measure R, L, C, Voltage, Current, Power factor, Power.
CO3	Measure R, L, C, Voltage, Current, Power factor, Power. Understand the basics of CRO and its applications.

CO4	Calculate unknown values for ac bridges.
CO5	Test frequency, phase with Oscilloscope & frequency generator

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: Basics of Measurement:
5 Hours

(i) Review of performance, specifications of instruments, accuracy, precision, sensitivity, resolution range etc. Errors in measurement and loading effects.

Unit II:Measuring Devices:8 Hours

2.1 Concept of byte organized memory.
(a) Address inputs.
(b) Address space.
(c) Data input/output.
2.2 Addressing and Address decoding.
(a) Memory system organization.
(b) Partitioning of total memory space into small blocks.
(c) Bus contention and how to avoid it.
2.3 Memory chips.
(a) Types of ROM, RAM, EPROM, PROM.
(b) Read/Write inputs.
(c) Chip enable/select input.
(d) Other control input/output signals.
- Address latching.
- Read output.
- Address strobes.
(f) Power supply inputs.
2.4 Extension of memory.
- In terms of word length and depth

Unit III: Cathode Ray Oscilloscope 10 Hours

(i) Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only no mathematical treatment) Deflection sensitivity, brief mention of screen phosphor for CRT in relation to their visual persistence and chemical composition
(ii) Explanation of time base operation and need for blanking during fly back; synchronization
(iii) Block diagram explanation of a basic CRO and a triggered sweep oscilloscope, front panel controls
(iv) Specifications of a CRO and their significance
(v) Use of CRO for the measurement of voltage (dc and ac) frequency, time period and phase angles
(vi) Special features of dual trace, delayed sweep and storage CROs (brief mention only); introduction to digital CROs
(vii) CRO probes, including current probes.

Unit IV: Signal Generators and Analysis Instruments 10 Hours

(i) Block diagram, explanation and specifications of (a) Laboratory type low frequency and RF signal generators, (b) Pulse generator and function generator
(ii) Brief idea for testing, specification for the above instruments
(iii) Distortion factor meter, wave analysis and spectrum analysis

(i) Block diagram explanation of working principles of a laboratory type (balancing type) RLC Bridge. Specifications of a RLC bridge. **(ii) Block diagram and working principles of a Q-meter**
Unit V: Digital Instruments **8 Hours**
(i) Comparison of analog and digital instruments, characteristics of a digital meter **(ii) Digital voltmeter** **(iii) Block diagram and working of a digital multi-meter** **(iv)Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time-base stability, accuracy and resolution** **(v) Principles of working and specifications of logic probes, signature analyzer and logic analyzer.** **(vi) Digital, LCR bridges**

Suggested Reading

1. J.B. JUPTA, "Electrical and Electronic Measurements and Instruments"

2. A. K. Sawhney - A course in Electrical & Electronic Measurement & Instrumentation - Dhanpat Rai & Sons.

Name of The Course	**Electronic Instruments & Measurements Lab**			
Course Code	**DPCO2019**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	**0**	**2**	**1**

Course Objectives:1. Understanding the requirements to generate electronic signals.

2. Discussing different techniques to stabilize strength and frequency

Course Outcomes

CO1	**Develop skill of multimeters, voltmeters, ammeters, CRO for electronics projects.**
CO2	**Measure R, L, C , Voltage, Current, Power factor , Power.**
CO3	**Calculate unknown values for ac bridges.**

Text Book (s):1. J.B. JUPTA, "Electrical and Electronic Measurements and Instruments"

Reference Book (s): A. K. Sawhney - A course in Electrical & Electronic Measurement & Instrumentation - Dhanpat Rai & Sons

List of Experiments
Ex.1
To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance
Ex.2
To observe the limitations of a multimeter for measuring high frequency voltages and currents
Ex.3
To measure Q of a coil and observe its dependence on frequency, using a Q-meter
Ex.4
Measurement of voltage, frequency, time period, and phase angle using CRO
Ex.5
Measurement of time period, frequency, average period using universal counter/frequency counter
Ex.6
Measurement of rise, fall and delay times using a CRO
Ex.7
Measurement of distortion of a LF signal generator using distortion factor meter
Ex.8
Measurement of R, L and C using a LCR bridge/universal bridge

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Computer Programming and Applications			
Course Code	DPCS2015			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	0	3

Course Objectives

1. To create awareness and emphasize the need for the roll of computer in Engineering.
2. To give a general understanding on working of computer.

Course Outcomes

CO1	Discuss the basic terminology used in computer programming. K2
CO2	Develop compile and debug programs in C language. K4
CO3	Use different data types in a computer program. K3
CO4	Develop programs involving decision structures, loops and functions. K4
CO5	Explain the difference between call by value and call by reference and programming skill.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: INTRODUCTION (Familiarization With Operating System): 5 Hours
(i) Review of performance, specifications of instruments, accuracy, precision, sensitivity, resolution range etc. Errors in measurement and loading effects.
Unit II:PROGRAMMING BASICS: :8 Hours
Introduction to computer Operating System (Dos, Windows'95).? Introduction to Dos structure, system files, batch files & configuration files. Booting the system from floppy & hard disk. Brief Introduction to Dos internal & external commands. Familiarization with windows structures, its use and application.
Unit III: ARRAYS AND STRINGS: 10 Hours
Arrays: Initialization – Declaration – One dimensional and two-dimensional arrays. String-: String operations – String Arrays. Simple programs: sorting- searching – matrix operations.
Unit IV: FUNCTIONS AND POINTERS: 10 Hours
Function: definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers: Definition – Initialization – Pointer's arithmetic – Pointers and arrays- Example Problems (Programs with user defined functions – Includes Parameter Passing)
Unit V:Digital Instruments 8 Hours
Introduction – need for structure data type – structure definition – Structure declaration –- Union
Commercial and business data processing application. Engineering computation. CAD, CAM, CAE, CAI.

Suggested Reading

1. J.B. JUPTA, "Electrical and Electronic Measurements and Instruments"

2. A. K. Sawhney - A course in Electrical & Electronic Measurement & Instrumentation - Dhanpat Rai & Sons.

Name of The Course	**Computer Programming and Applications Lab**				
Course Code	**DPCS2014**				
Prerequisite					
Corequisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

Course Objectives:1. Understand the dynamics of memory by the use of pointers.

2. Explain the difference between call by value and call by reference and programming skill

Course Outcomes

CO1	**Develop compile and debug programs in C language**
CO2	**Use different data types in a computer program.**
CO3	**Develop programs involving decision structures, loops and functions**

Text Book (s):1. B. RAM " Computer Fundamentals Architecture and Organization " New Age International

Reference Book (s): Henry Lucas " Information Technology for Management " Mcgraw-Hill College

List of Experiments
Ex.1
Create database file
Ex.2
C Programming using Simple statements and expressions
Ex.3
Scientific problem-solving using decision making and looping
Ex.4
Simple programming for one dimensional and two-dimensional arrays.
Ex.5
Solving problems using String functions
Ex.6
Programs with user defined functions – Includes Parameter Passing
Ex.7
Program using Recursive Function.
Ex.8
Program using structures and unions.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	Modern Communication Systems			
Course Code	DPCO3002			
Prerequisite	DPCO2008			
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	0	3

Course Objectives

1. Demonstrate understanding of various analog and digital modulation and demodulation techniques.

2. To enable the student to become familiar with satellites and satellite services.

Course Outcomes

CO1	Discuss the basic ideas of Communication System
CO2	Apply basic concept of fibre optical system and optical communication
CO3	Identify Digital communication like sampling, modulation and error detection and correction capability
CO4	Illustrate the basic concepts of Satellite communication and ideas about different orbits.
CO5	Design and working principles of mobile communication.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: INTRODUCTION TO COMMUNICATION SYSTEM 3 Hour

Basic idea of telegraphy, telephonic, digital, microwave, fiber optics, satellite, mobile and data communication.

Unit II:OPTICAL COMMUNICATION AND DEVICES 8 Hours

2.1 Introduction : Block diagram of optical fiber communication system, advantages of optical communication

2.2 Optical Fiber : Structure of optical wave guide, light propagation in optical fiber, Ray and wave theory, Modes in optical fiber, Step and Graded index fibers

2.3 Transmission Characteristics of Optical Fibers : Signal degradation in optical fibers, Attenuation losses in optical fibers. Dispersion and pulse broadening in different types of fibers, Modal birefringence and polarization maintaining fibers.

2.4 Requirements for Photo detectors, Types of photo detectors, Characteristics of photo detectors. Principle of APD and Pin diodes. Phot transistor and Photo Conductors.

2.5 Components of an optical fiber communication system, Digital and Analog Optical Communication System.

2.6 Semiconductor Lasers - Laser action, PN junction laser, Febry- Perot resonators.

2.7 Optical Detectors: Introduction, Photodiode- Material and types. Avalanche Photo Diode (APD), PIN diode, Temperature effect on avalanche gain, noise in APD.

Unit III: DIGITAL COMMUNICATION 10 Hours

3.1 Elements of Digital Communication and information theory: Model of a digital communication system, Logarithmic measure of information. Source coding fixed in and variable length code words. Hartley-Shannon law for channel.

3.2 Sampling Theory and Pulse Modulation: Sampling theorem, Signal reconstruction in time domain. Types of analog pulse modulation, Method of generation and detection of PWM, PNM and PPM.

3.3 Waveform Coding Technique: Quantization, Quantization noise, Encoding and Pulse code modulation, Differential pulse code modulation, Delta modulation, Comparison of PCM and DM.

3.4 Digital Multiplexing: Fundamentals of time division multiplexing electronic commutator.

3.5 Digital Modulation Techniques: Types of digital modulation, Wave forms for amplitude, Frequency and phase shift keying, Method of generation and detection of coherent and noncoherent binary ASK, FSK & PSK, Differential phase shift, Quadrature modulation techniques. (QPSK and MSK) Probability of error and comparison of various digital modulation techniques.

3.6 Error Control Coding: Error free communication over a noisy channel, hamming sphere, hamming distance and Hamming bound, Relation between minimum distance and error detecting and correcting capability.

Unit IV: SATELLITE COMMUNICATION 10 Hours

4.1 Introduction, historical background and basic Concepts of satellite communication. Elements of satellite communication link. **4.2 Geostationary orbits, Orbit mechanisms and launching of satellite.** **4.3 Satellite space craft- Satellite sub system, Tracking and Command, Communication subsystem, Transponders, Space Craft antenna.** **4.4 Satellite Channel and Link Design: Design of down links and uplinks.** **4.5 Multiple access techniques: Frequency Division Multiple Access (FDMA), FDM/FM/FMFDMA, Time division, Multiple Access, Frame Structure and Synchronization, Code division, Multiple Access, random Access.** **4.6 Introduction to DTH system**
Unit V: MOBILE COMMUNICATION **8 Hours**
5.1 Evaluation of mobile communication, A simplified reference model for mobile communications. **5.2 A brief introduction of frequency for radio transmission, signals, propagation, Multiplexing, Modulation, Spread spectrum, Cellular system.** **5.3 Medium Access Control: Introduction To MAC, Advance Mobile Phone. Introduction to GSM (Global System for Mobile Communication), GPRS, GPS, Enable Positioning System.**

Suggested Reading

1. J. Gowar - Optical Communication - PHI.

2. D. C. Agarwal - Satellite Communication - Khanna Pub.

Name of The Course	**Modern Communication Systems Lab**			
Course Code	**DPCO3007**			
Prerequisite				
Corequisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	**0**	**2**	**1**

Course Objectives:1. Demonstrate understanding of various analog and digital modulation and demodulation techniques.

2. To enable the student to become familiar with satellites and satellite services.

Course Outcomes

CO1	**Apply basic concept of fiber optical system and optical communication**
CO2	**Illustrate the basic concepts of Satellite communication and ideas about different orbits.**
CO3	**Identify Digital communication like sampling, modulation and error detection and correction capability**

Text Book (s):1. J. Gowar - Optical Communication - PHI.

Reference Book (s): D. C. Agarwal - Satellite Communication - Khanna Pub

List of Experiments
Ex.1
To study the parts of telephone hand set: **(a) Frequency response of telephone receiver.** **(b) To observe the wave form of impulses by dialing a number.**

Ex.2
Visit and study of Digital Switching System
Ex.3
Visit and study of Satellite transmission system.
Ex.4
Demonstration of sampling, FSk and PSK by simple experiment.
Ex.5
Demonstration of optical fiber communication through simple kits.
Ex.6
Study of working of mobile phones and its services.
Ex.7
Study and use of ISDN and Internet services
Ex.8
Testing and fault finding of mobile phone and its service.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	**INDUSTRIAL ELECTRONICS AND TRANSDUCERS**			
Course Code	**DPCO3003**			
Prerequisite	**None**			
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Objectives

1.Describe modern electronic devices available in industry e.g., thyristors, Inverters etc.

2.Discuss different types of heating

3.Explain single and three phase devices

4. Sensing devices (sensors & Transducers) and optoelectronics

Course Outcomes

CO1	**Describe modern electronic devices available in industry e.g., thyristors, Inverters etc.**
CO2	**Discuss different types of heating**
CO3	**Explain single and three phase devices**
CO4	**Examine sensing devices (sensors & Transducers)**
CO5	**Illustrate basic concepts of Opto-electronic devices**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-I Thyristor family & its application 9 hours
1.1Name, symbol and typical applications of members of thyristor family. **1.2SCR, Triac and Diac-Basic structure, operation, V-I characteristics and ratings, gate circuits, ratings, triggering process and triggering circuits, turn off methods and circuits, selections of heat sinks, mounting of thyristor on heat sinks, basic idea of protection of thyristor circuits.** **1.3Operation, V-I characteristics, equivalent circuit and parameters of an UJT: Description of UJT relaxation oscillator, use of UJT relaxation oscillator for triggering thyristors.** **1.4Diac SCR and Triac switching circuits like automatic battery charger, voltage regulator, emergency light, alarm circuits, time delay relay circuits and circuits for over current and over voltage protection.** **1.5 Single phase, various types of phase-controlled rectifiers using SCR for resistive and inductive load explanation using wave shapes and appropriate mathematical equation (No derivation).** **1.6 A.C. phase control using SCRs and triacs, Application of phase-controlled rectifiers and A.C. phase control circuits in illumination control, temperature control, variable speed drives using d.c. moters and small a.c. Machines** **1.7Half wave, full wave (including bridge) poly phase rectifiers using SCRs; explanation using wave shapes and formula (no derivation). Operation of three Phase Bridge controlled rectifier and its applications.** **1.8Principle of operation of basic inverter circuits, basic series and parallel commutated inverters, principle of operation of cycloconverter, choppers and dual converter, mention of applications.** **Project Based Learning: Comparison chart of thyristor family elements.**
Unit II: PRINCIPLES AND APPLICATIONS OF INDUCTION AND DIELECTRIC HEATING 8 Hours
2.1Introduction, importance of heating in industry, 2.2Principle of induction heating **2.3Industrial applications of induction heating** **2.4Principle of dielectric heating,** **2.5Industrial applications of dielectric heating**
Unit III: Sensors and Transducers **9 Hours**
3.1Temperature and pressure sensors: **3.2Basic working Principle and application.** **3.3Basic idea and principle of operation and their use in 3.4measuring physical parameters of the following types of transducers** **a. Variable Resistance Type Potentiometric Resistance strain gauge Displacement and force** **b. Variable Capacitance Type Displacement and pressure**
Unit IV: Processing of Transducers Signals 4 Hours
4.1Characteristics of instrumentation amplifiers in respect of input impedance, output impedance, drift, dc offset, noise, gain common mode rejection, frequency response

etc. 4.2Relating the suitability of these characteristics for amplifying signals from various transducers.
Unit V: Optoelectronics devices 9 Hours
5.1Basic principle and characteristics of photo sources and photo detector, Photo resisters, photo diodes, photo transistors, photo electric cells, LCDs, LEDs and photo-couplers 5.2LED- Material, Construction, Working, Power & Efficiency, Characteristics and modulation BW. Laser, Semiconductor Laser. 5.3Photo Detectors - Optical detection Principles, P-N photodiode, Avalanche Photodiode 5.4Electro-Optic Effect- Integrated optical Devices, Magneto- Optic Effect, Acousto-Optic Effect 5.5Sensors & Display Devices - Optical Fiber Sensors, Display Devices, LCD display, Numeric Display. (Only Brief description of above) Project Based Learning: Designing a working module using optoelectronics devices.

Suggested Reading

1.H. Rashid-" Power Electronics Circuits, Devices & Application"- P.H.I

2. C. S. Ranjan- "Instrumentation Devices & Systems"- Tata McGraw Hill.

3. Singh Jasprit - " Optoelectronics an Introduction to Materials and Devices" - McGraw-Hill

Name of The Course	**INDUSTRIAL ELECTRONICS AND TRANSDUCERS LAB**				
Course Code	**DPCO3008**				
Prerequisite					
Corequisite					
Anti -requisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

Course Objectives:

1. Use tools/test equipment to analyze electronic components.

2. Design basic electronic circuits.

Course Outcomes

CO1	**Describe modern electronic devices available in industry e.g., thyristors, Inverters etc.**
CO2	**Explain single and three phase devices**
CO3	**Examine sensing devices (sensors & Transducers)**
CO4	**Illustrate basic concepts of Opto-electronic devices.**

Course Content

Ex.1
Identification of various types of packages and terminals of various low and high-power thyristors (SCR and Triac).
Ex.2
To determine and plot firing characteristics of SCR: - **(a) By varying the anode to cathode voltage.** **(b) By varying the gate current.**

Ex.3
To observe that logic low and logic high of logic gate.
Ex.4
Observation of waveshapes at relevant points of the circuit of a single-phase controlled rectifier using SCR and UJT relaxation oscillator Observation of waveshapes at relevant points of the circuit of a single-phase controlled rectifier using SCR and UJT relaxation oscillator
Ex.5
To determine the firing characteristics of Triac in different mode i.e., Mode-I (plus), Mode-I (minus), Mode-III (plus), Mode-III (minus).
Ex.6
Observe the waveshapes and measure a.c. and d.c voltage at various points of a three-phase bridge rectifier circuit
Ex.7
Test an a.c. phase control circuit using triac and observe waveshapes and voltages at relevant points in circuit (while using for lamp intensity control and/or a.c. fan speed control).
Ex.8
To study the working of a single-phase SCR/ transistor inverter circuit by observing waveshapes at input and output.
Ex.9
To measure force and pressure by using strain gauge transducer.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	-	50	100

Name of The Course	**Microelectronics-I**			
Course Code	**DPCO3004**			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Objectives

1. Outline the progress made in the history of microelectronics.

2. Describe the evolution of microelectronics from point-to-point wiring through high element

3. Identify printed circuit boards, diodes, transistors, and the various types of integrated circuits.

Course Outcomes

CO1	**Describe the properties of semiconductor and semiconductor devices. (k2)**
CO2	**Illustrate theoretical and practical aspects of IC fabrication technology. (k3)**
CO3	**Analyze several fabrication steps such as epitaxiEs, oxidation, chemical vapor deposition, etching, ion implantation, metallization, lithography etc.(k4)**

CO4	Explain the manufacturing methods and their underlying scientific principles in the context of technologies used in VLSI chip fabrication. (k2)
CO5	Describe typical packaging levels presently used for microelectronic systems.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit I: INTRODUCTION 2 Hours
Importance of micro-electronics in modern technology.
Unit II:CRYSTAL PROPERTIES AND GROWTH OF SEMICONDUCTORS BULK 8 Hours
2.1 Crystal Lattice **2.2 Periodic structures** **2.3 Planes and directions** **2.4 diamond and zinc-blende lattice.** **2.5 Crystal Growth from Melt.** **2.6 Zone Refining.** **2.7 Wafer shaping, Cleaning and polishing.**
Unit III: REVIEW OF SEMI-CONDUCTOR PROPERTIES 10 Hours
3.1 Nature of intrinsic Silicon **3.2 Doping**
3.3 Electrical conductivity **3.4 p-n junction at zero reverse and formal bias** **3.5 the diode equation** **3.6 capacitance of p-n junction** **3.7 electric field and break down voltage of p-n junctions.** **3.8 Energy band diagram of ideal MOS, Schottky barriers, Threshold voltage, Non-ideal effects.**
Unit IV: EPITAXIAL GROWTH 10 Hours
4.1 Lattice matching **4.2 Need for epitaxy** **4.3 Vapor phase epitaxy** **4.4 Liquid phase epitaxy** **4.5 Molecular-Beam epitaxy** **4.6 Silicon on insulators.**
Unit V:OXIDATION & POLYSILICON FILM DEPOSITION 8 Hours
5.1 Thermal oxidation **5.2 Dielectric and Polysilicon deposition** **5.3 Metallization** **5.4 Basic processes of vacuum evaporation Patterning techniques** **5.5 Metallization Application.**

Suggested Reading

1. S. M Sze, Semiconductor Devices Physics and Technology, John Wiley & Son, Inc. 2nd edition, 2002

2 . Donald A. Neamen, Semiconductor Physics and Devices Basic Principles, McGraw Hill, 3rd edition, 2003.

Name of The Course	Bio Medical Electronics			
Course Code	DPCO3005			
Prerequisite	None			
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	0	3

Course Objectives

1.Outline the diagnostic techniques in biomedical electronics

2. Describe the patient care and monitoring techniques

3. Identify the biotelemetry systems in biomedical instrumentation systems.

4. Respiratory system

Course Outcomes

CO1	Describe the classification of the transducers
CO2	Illustrate the sources of bio-electric potential
CO3	Analyze the cardiovascular measurement
CO4	Explain the respiratory system for biomedical instrumentation
CO5	Prosthetic devices
CO6	Modern biomedical electronics

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Course Content:

Unit-I INTRODUCTION: TRANSDUCER & ELECTRODES 8 Hours **1.1 The age of biomedical and transducers principles.** **1.2 Active& Passive transducers.** **1.3 Electrodes: Electrode theory, Biopotential Electrodes.** **1.4 Biochemical transducers, Reference Electrodes electrodes.** **1.5 Electrodes: Electrode theory, Biopotential Electrodes.** **1.6 Blood Gas Electrodes.**
Unit II: BIOELECTRIC POTENTIALS CARDIOVASCULAR MEASUREMENT 8 Hours
2.1 Resting and action potentials **2.2The bioelectric potential-ECG, EEG** **2.3 Electrocardiography - ECG amplifiers, Electrodes and leads, ECG recorder** **2.4 EGC system for stress testing, Continuous ECG recording.** **2.5 Blood flow measurement** **2.6 Heart sound measurements**
Unit III: Respiratory System Diagnostic Techniques 8 Hours
3.1 Physiology of respiratory system, Measurement of breathing mechanics **3.2 Spirometer, Respiratory Therapy equipment : Inhalators ventilators and respirators,** **3.3 Humidifiers, Nebulizers and Aspirators** **3.4 Ultrasonic Diagnosis Eco - Cardiography, Eco, Encephalography** **3.5 Emission Computerized Tomography, MRI.**

3.6 Ophthalmic Scans, X-Ray and Radio-isotope instrumentation, CAT Scan
Unit IV: Patient Care Monitoring & Bio Telemen 4 Hours
4.1Elements of Intensive Care Monitoring Patient Monitoring **4.2 Diagnosis, Pacemakers, Defibrillators** **4.3 Telemetry for ECG measurement during exercise, For emergency patient monitoring** **4.4 Current Safety of Medical Electronic Equipment**
Unit V: Other Prosthetic Devices 5 Hours
5.1 Prosthetic devices **5.2Special aspects-Safety of Medical Electronic Equipment** **5.3Shok hazards from Electrical equipment** **5.4Hearing Aid, Myoelectric Arm**

Suggested Reading

- **Cornwell- Biomedical Instrumentation and Measurements-Prentice Hall (India)**
- **Biomedical Instrumentation and Measurements Paperback – 2015 by Cromwell (Author)**
- **Introduction to Biomedical Technology by J. J. Karr & J. M. Brown, Pearson Publication.**
-

Name of The Course	**Field Visit and Presentation**				
Course Code	**DPCO3009**				
Prerequisite					
Corequisite					
Anti-requisite					
		L	**T**	**P**	**C**
		0	**0**	**4**	**2**

Course Objectives:

1. Industry visits sensitize students to the practical challenges that organizations face in the technical world.

2. It gives greater clarity about various technical concepts for students as they can practically see how these concepts are put into action.

Course Outcomes

CO1	**discover the practical exposure to different testing facilities available in the Industries. (K4)**
CO2	**Test for Core concepts related with Automation. (K4)**
CO3	**Adapt the importance of working safety. (K6)**
CO4	**Identify the Current industry needs. (K3)**
CO5	**Make use of effective Communication both orally and in writing. (K3)**

Text Book (s):1. Electronics Engineering Books

Ex.1
Introduction
Ex.2
About the process
Ex.3
Safety
Ex.4
Operation unit 1
Ex.5
Report Writing

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	PROJECT-II			
Course Code	DPCO9999			
Prerequisite				
Corequisite				
Anti-requisite				
	L	T	P	C
	0	0	32	16

Course Objectives:1. This course will Increase practical knowledge of student.

Course Outcomes

CO1	Create a own data or implementation on previous data project.
CO2	Create model to exhibit project.
CO3	Understand basic concept of electronics & communication engineering from live project.
CO4	Describe presentation on project.
CO5	Explain their project.

Text Book (s):1. Electronics Engineering Books

Ex.1
planning the project
Ex.2
creating the group to work on
Ex.3
prepare plan of project include report, Circuit Design, drawing, ppt
Ex.4
creating model of project
Ex.5
final project report

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100