

FOURTH SEMESTER

SUBJECT CODE	SUBJECT	HOURS PER WEEK			
		THEORY HOURS	TUTORIAL HOURS	PRACTICAL HOURS	TOTAL HOURS
4040410	Industrial Electronics	5	-	-	5
4040420	Communication Engineering	5	-	-	5
4040430	Analog and Digital Electronics	4	-	-	4
4040440	Industrial Electronics Practical	-	-	5	5
4040450	Communication Engineering Practical	-	-	4	4
4040460	Analog and Digital Electronics Practical	-	-	5	5
4020620	E-Vehicle Technology & Policy #	4	-	-	4
	Physical Education	-	2	-	2
	Library	-	1	-	1
Total		18	3	14	35

Common with Mechanical Engineering

FOURTH SEMESTER

Subject Code	Subject	Examination				Duration
		Marks			Total	
		Internal Assessment	Board Examinations	Total		
4040410	Industrial Electronics	25	100*	100	3 Hrs.	
4040420	Communication Engineering	25	100*	100	3 Hrs.	
4040430	Analog and Digital Electronics	25	100*	100	3 Hrs.	
4040440	Industrial Electronics Practical	25	100*	100	3 Hrs.	
4040450	Communication Engineering Practical	25	100*	100	3 Hrs.	
4040460	Analog and Digital Electronics Practical	25	100*	100	3 Hrs.	
4020620	E-Vehicle Technology & Policy #	25	100*	100	3 Hrs.	
	Physical Education					
	Library					

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Common with Mechanical Engineering

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS
N-SCHEME

(To be Implemented for the students admitted from the year 2020 - 2021 onwards)

Course Name : 1040:Electronics and Communication Engineering
Course Code : 4040410
Semester : IV Semester
Subject Title : INDUSTRIAL ELECTRONICS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
			Internal Assessment	Board Examinations	Total	
INDUSTRIAL ELECTRONICS	5	80	25	100*	100	3 Hrs.

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	POWER DEVICES AND TRIGGER CIRCUITS	15
II	CONVERTERS AND CHOPPERS	15
III	INVERTERS & APPLICATIONS	14
IV	PROGRAMMABLE LOGIC CONTROLLER	14
V	BUILDING BLOCKS OF A ROBOT	15
	REVISION – TESTS – MODEL	7
Total		80

RATIONALE:

The rationale behind the modifying this subject is to give clear explanation of power devices and circuits that are widely used today in modern industry. It also gives exposure to PLCs & ROBOT's which can perform various control functions in industrial environments.

OBJECTIVES:

On completion of the following units of the syllabus contents, the students must be able to

- Study working principle of MOSFET, IGBT
- Study the methods of triggering
- Learn about converters and its types.
- understand commutation concepts in SCR
- Learn about choppers.
- Study about inverters and types.
- Understand the concept of HVDC.
- Know about SMPS.
- Understand about UPS and its types.
- Learn about PLC.
- Discuss about ladder diagrams.
- To understand the basic concepts associated with the design, functioning, applications and social aspects of robots
- To study about the electrical drive systems and sensors used in robotics for various applications

4040410 INDUSTRIAL ELECTRONICS

DETAILED SYLLABUS

Contents:Theory

Unit	Name of the Topics	Hours
I	POWER DEVICES AND TRIGGER CIRCUITS	
	<p>1.1 POWER DEVICES Insulated gate bipolar transistor (IGBT), MOSFET and GTO - Symbol, principle of working, VI characteristics and applications. Comparison between power MOSFET, power transistor and power IGBT.</p> <p>1.2 TRIGGER CIRCUITS Triggering of SCR - Gate triggering – Types –Concepts of DC triggering, AC triggering, Pulse gate triggering – Pulse transformer in trigger circuit – Electrical isolation by opto isolator - Resistance capacitor firing circuit and waveform, Synchronized UJT triggering (ramp triggering) circuit and waveform.</p>	7 8
II	CONVERTERS AND CHOPPERS (Qualitative treatment only)	
	<p>2.1 CONVERTERS Converters – Definition – Single phase Half controlled bridge converter with R load and RL load - importance of flywheel diode – Single phase fully controlled bridge converter with resistive load – voltage and current waveforms – Single phase fully controlled bridge converter with RL load – voltage and current waveforms Commutation- Natural commutation – Forced commutation – Types</p> <p>2.2 CHOPPERS Chopper – Definition –principle of DC chopper operation – Typical chopper circuit (Jones chopper) – Applications of DC chopper – Principle of working of single phase AC chopper - Chopper using MOSFET.</p>	9 6
III	INVERTERS & APPLICATIONS	
	<p>3.1 INVERTERS inverter with resistive load – Single phase inverter with RL load – Methods to obtain sine wave output from an inverter- Output voltage control in inverters - McMurray inverter – advantages – Parallel</p> <p>3.2 INVERTER APPLICATIONS SMPS Types - Block diagram of SMPS – advantages and disadvantages. UPS-Type (ON Line, OFF Line), Comparison.- Battery Banks.</p>	8 6

IV	<p>PROGRAMMABLE LOGIC CONTROLLER</p> <p>4.1 BASICS OF PLC Evolution – advantages over relay logic- Introduction to PLC – Relays- Block diagram of PLC - PLC Programming Languages - Arithmetic Functions (add, sub, mul, div, sqr) – Comparison of functions - Basics of Input and output module.</p>	7
	<p>4.2 PLC FUNCTIONS (digital input and output module) - Logic functions- AND logic, OR logic, NAND logic, EX-OR logic - symbols used in ladder logic diagram. Ladder programming – Ladder diagram for simple systems – Star delta starter, Conveyer control and Lift control. PLC interface with GSM</p>	7
V	<p>INTRODUCTION TO ROBOT</p> <p>5.1 BUILDING BLOCKS OF A ROBOT Types of electric motors - DC, Servo, Stepper; specification, drives for motors - speed & direction control and circuitry, Selection criterion for actuators, direct drives, non-traditional actuators.</p>	8
	<p>5.2 ROBOT SENSOR Sensors for localization, navigation, obstacle avoidance and path planning in known and unknown environments – optical, inertial, thermal, chemical, biosensor, other common sensors; Case study on choice of sensors and actuators for maze solving robot and self-driving cars</p>	7

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REFERENCE BOOKS:

1. Power Electronics by M.H.Rashid - PHI Publication-3 rd Edition-2005
2. Industrial Electronics and control by Biswanath Paul –PHI publications2 nd Edition -2010
3. Programmable Logic Controllers - “Frank D.Petruzela “PHI publications
4. Power Electronics by Dr.P.S.Bimbhra, Khanna publishers -2 nd Edition1998
4. Saeed. B. Niku, Introduction to Robotics, Analysis, system, Applications, Pearson educations, 2002
5. Roland Siegwart, Illah Reza Nourbakhsh, Introduction to Autonomous Mobile Robots, MIT Press, 2011.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS
N SCHEME

(To be Implemented for the students admitted from the year 2020 - 2021 onwards)

Course Name : 1040: Electronics and Communication Engineering

Subject Code : 4040420

Semester : IV

Subject title : COMMUNICATION ENGINEERING

TEACHING AND SCHEME OF EXAMINATION

No of weeks/ semester: 16 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Communication Engineering	5	80	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and allocation of hours

Unit	Topic	Hrs
I	Networks, Filters, Antenna and Propagation	16
II	Amplitude Modulation	15
III	Frequency Modulation	15
IV	Pulse Modulation	13
V	Audio , Video Systems and Displays	14
	Tests and Model Exam	7
Total		80

RATIONALE:

Today communication engineering has developed to a great extent that there is always the need for study of various communication concepts. This subject fulfills the need for students to have a thorough knowledge of Filters, various types of Antennas, modulations, audio systems, video systems and displays

OBJECTIVES:

On completion of the following units of the syllabus contents, the students must be able to

- Understand the concepts of networks
- Understand the applications of Filters
- Know the Electro Magnetic Frequency Spectrum
- Know the relationship between Wave length and Frequency
- Understand the principles of working of antennas
- Understand the theory of Propagation
- Understand the concept of modulation
- Study Amplitude Modulation Process
- Learn about different types of AM Transmitters & receivers
- Study the Frequency Modulation Process
- Learn about different types of FM Transmitters & Receivers
- Understand the concept Pulse Modulation
- Learn about different type of Pulse Analog modulation Techniques
- Learn about different type of Pulse Digital modulation Techniques
- Learn Different types of Microphones
- Learn Different types of Loudspeaker
- Understand the principles of Monochrome & colour TV fundamentals
- Understand the concept of Colour transmission and reception in PAL COLOUR TV Receiver
- Understand the concept of various types of displays

4040420 COMMUNICATION ENGINEERING

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the topics	Hours
I	<p>NETWORKS, FILTERS, ANTENNA AND PROPAGATION.</p> <p>1.1: SYMMETRIACAL AND ASYMMETRICAL NETWORKS Definition – Comparison – Characteristic impedance and Propagation constant</p> <p>1.2: FILTERS Definition, Types – circuit elements and cut-off frequencies of Constant K – LPF, HPF and BPF (Qualitative analysis only) - applications.</p> <p>1.3: ELECTROMAGNETIC FREQUENCY SPECTRUM Electromagnetic Frequency Spectrum - Types of Electro Magnetic Radiation and their applications</p> <p>1.4: RELATIONSHIP BETWEEN WAVELENGTH AND FREQUENCY</p> <p>1.5: ANTENNA Definition – types of antenna: Monopole and dipole antenna, directional and Omnidirectional antenna, Dipole arrays – Yagi antenna, parabolic antenna – Antenna parameters: radiation pattern and polarization – applications.</p> <p>1.6: PROPAGATION Types of Propagation - Concept, Frequency Range, Advantages, Applications of Ground wave, Sky wave and Space wave propagation – Factors affecting the field strength in Ground wave propagation – Effects of Atmosphere in Space wave propagation – Definition of the terms in Sky wave propagation: Critical Frequency, MUF (Maximum Usable Frequency and Skip distance)</p>	<p>3</p> <p>3</p> <p>2</p> <p>1</p> <p>3</p> <p>4</p>
II	<p>AMPLITUDE MODULATION</p> <p>2.1: Introduction to Modulation Definition – Need for modulation - Types of modulation - Electromagnetic frequency spectrum - Relationship between Wavelength and Frequency.</p> <p>2.2: Amplitude modulation (AM) Definition - Waveform representation of AM - Expression for AM and modulation index - Frequency spectrum of AM - AM sidebands: DSB, SSB and VSB.</p> <p>2.3: AM Transmitter</p>	<p>3</p> <p>4</p> <p>4</p>

	Types of transmitters: High level AM transmitter, Low level AM transmitter and SSB transmitter. 2.4: AM Receiver Super Heterodyne receiver - Importance of IF in AM Receiver. Selection of IF (Intermediate Frequency)	4
III	FREQUENCY MODULATION 3.1: Frequency modulation Definition-Waveform representation of Frequency modulation, Expression for Frequency modulation and modulation index. Frequency spectrum of FM – Effects of modulation index in frequency spectrum. 3.2: FM Transmitter Types-Direct FM transmitter-Indirect FM transmitter and Stereophonic FM transmitter. 3.3: FM Receiver Stereophonic FM receiver-AFC - Comparison of FM and AM.	6 5 4
IV	PULSE MODULATION TECHNIQUES 4.1: INTRODUCTION Definition- Types of Pulse modulation- Sampling and Quantization- Sampling theorem- Nyquist sampling rate 4.2: PULSE ANALOG MODULATION TECHNIQUES Generation and detection of PAM, PWM, PPM 4.3: PULSE DIGITAL MODULATION TECHNIQUES PCM & DPCM- Delta modulation- Adaptive Delta modulation	4 5 4
V	AUDIO AND VIDEO SYSTEMS 5.1: Microphones Definition- Construction and performance of the following microphones: Carbon, Moving coil and Velocity ribbon. 5.2: Loudspeakers Construction and working of dynamic cone type - Surround sound systems. 5.3: Monochrome Television Scanning principles- synchronization - aspect ratio- Composite Video Signal - TV broadcasting standards.	3 3 3 3

<p>5.4: ColorTV Principlesofcolortransmissionandreception-Block diagram and working of PAL Colour TV Receiver</p> <p>5.5: DISPLAYS Construction and working principle of LED ,OLED and Plasma display</p>	<p>2</p>
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REFERENCE BOOKS:

1. Networkslines and fields – John D.Ryder, PHI
2. Electronic communication Systems– Kennedy–TMH
3. Electronic Communication– Dennis RoddyandJohn colen– PHI
4. Fundamentals ofAcoustics–Kingsler&frey–WileyEastern ltd.
5. TV and Video engineering– Arvind M.Dhake – TMH.
6. CommunicationElectronics–Principlesandapplication–LouisEFrenzel, Third Edition, Tata McGrawhillpublication
7. AudioandVideosystem–Principles,maintenanceandTroubleshooting byR.Gupta Second Edition McGrawHill Education(P) Ltd.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS
N SCHEME

(To be Implemented for the students admitted from the year 2020 - 2021 onwards)

Course Name : 1040: Electronics and Communication Engineering

Subject Code : 4040430

Semester : IV

Subject title : ANALOG AND DIGITAL ELECTRONICS

TEACHING AND SCHEME OF EXAMINATION

No of weeks/ semester: 16 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Analog and Digital Electronics	4	64	25	100*	100	3 Hrs

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of hours

Unit	Topic	Hrs
I	Linear ICs and OP-amps	10
II	A/D, D/A, Special Function ICs and IC Voltage Regulators	13
III	Boolean Algebra and Arithmetic operations	10
IV	Combinational and Sequential Logic Circuits	12
V	Memories	12
	Tests and Model Exam	7
Total		64

RATIONALE:

The subject Analog and Digital Electronics holds applications in all branches of engineering instrumentation and Industrial Automation. This will impart in depth knowledge of Number Systems, Logics of Combinational & Sequential circuits and memories.

OBJECTIVES:

On completion of the following units of the syllabus contents, the students must be able to

- Understand the basics of operational amplifier.
- Know the op-amp applications.
- Know the waveform generator and Active filter.
- Know the concept of D/A and A/D converters
- Know the applications of Special function IC, IC 555 Timer.
- Understand various Number Systems used in Digital Circuits
- Understand basic Boolean postulates and laws.
- Understand the De-Morgan's theorem.
- Understand the concept of Karnaugh Map.
- Learn about Basic logic Gates.
- Study about Boolean techniques.
- Learn the different digital logic families
- Learn arithmetic circuits- Adder/Subtractor
- Understand the encoder/decoder & MUX / DEMUX
- Understand the concept of parity Generator and checker
- Understand various types of flip-flops.
- Understand various types of counters
- Understand various modes of shift registers
- Understand various types of memories

4040430 ANALOG AND DIGITAL ELECTRONICS
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the topics	Hours
I	LINEAR ICS AND OP-AMPS	4
	1.1: OPERATIONAL AMPLIFIER Ideal Op-Amp – Block diagram and Characteristics – Op-amp parameters CMRR – Slew rate – Concept of Virtual ground	4
	1.2: APPLICATIONS OF OP-AMP Inverting amplifier –Summing amplifier – Non inverting amplifier – Voltage follower - Comparator – Zero crossing detector – Integrator – Differentiator- waveform generation (SchmittTrigger only)–RC Low pass Active filter.	2
	1.3: OP-AMP SPECIFICATIONS OP-amp 741 – Symbol – Pin diagram – Specifications	
II	A/D, D/A ,SPECIAL FUNCTION ICs AND IC VOLTAGE REGULATORS	2
	2.1: SAMPLING AND QUANTIZATION	
	2.2: A/D CONVERTER Analog to digital conversion using Ramp method – Successive approximation method – Dual slopmethod – Specifications of A/D converter	3
	2.3: D/A CONVERTER Basic concepts – Weighted Resistor D/A converter – R-2R Ladder D/Aconverter – Specifications of DAC IC	2
	2.4:SPECIAL FUNCTION ICs 2.4.1:IC555 Timer – Pin diagram - Functional Block diagram of IC 555 in Astable and MonostableMultivibrator mode - Schmitt trigger using IC 555 2.4.2:IC 565-PLL-Pin diagram-Functional Block diagram of IC 565 2.4.3:IC 566-VCO-Pin diagram-Functional Block diagram of IC 566	3
2.5.: IC VOLTAGE REGULATORS Positive IC Voltage Regulators: 78XX - Negative IC Voltage Regulators: 79XX and General purpose IC Voltage Regulatorsusing LM 723.	3	

III	<p>BOOLEAN ALGEBRA AND ARITHMETIC OPERATIONS</p> <p>3.1: NUMBER SYSTEMS Decimal – Binary – Octal – Hexadecimal – BCD – Conversion from one number system to other – Boolean Algebra – Basic laws and Demorgan's Theorems</p> <p>3.2: UNIVERSAL GATES Realization of basic logic gates using universal gates NAND and NOR -Tristate Buffer circuit</p> <p>3.3: PROBLEMS USING 2, 3, AND 4 VARIABLES Boolean expression for outputs – Simplification of Boolean expression using Karnaugh map (up to 4 variable)- Constructing logic circuits for the Boolean expressions</p> <p>3.4: ARITHMETIC OPERATIONS Binary Addition-Binary Subtraction-1's compliment and 2's compliment-Signed binary numbers</p> <p>3.5: ARITHMETIC CIRCUITS Half Adder-Full Adder-Half Subtractor-Full Subtractor</p>	<p>2</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p>
IV	<p>COMBINATIONAL AND SEQUENTIAL LOGIC CIRCUITS</p> <p>4.1: PARITY GENERATOR AND CHECKER</p> <p>4.2: DECIMAL to BCD ENCODER</p> <p>4.3: 3 to 8 DECODER</p> <p>4.4: MULTIPLEXER: 4 to 1 Multiplexer</p> <p>4.5: DEMULTIPLEXER : 1 to 4 Demultiplexer</p> <p>4.6: FLIP-FLOPS (FF) RS FF– JK FF: Master Slave FF and Edge triggered FF – D and T FF</p> <p>4.7: COUNTERS 4 bit Asynchronous Up Counter –Mod N counter – Decade counter – 4 bit Synchronous up counter</p> <p>4.8: SHIFT REGISTER 4 bit shift register – Serial in Serial out</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>3</p> <p>2</p>

V	<p>MEMORIES</p> <p>5.1:CLASSIFICATION OF MEMORIES</p> <p>5.2:RAM RAMorganization-AddressLines and MemorySize- Read/writeoperations-Static RAM-BipolarRAMcell- Dynamic RAM- SD RAM- DDR RAM.</p> <p>5.3:ROM ROM organization-Expanding memory- PROM- EPROM- and EEPROM- Flash memory- Anti Fuse Technologies.</p>	<p>6</p> <p>6</p>
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Reference books:

1. Albert Paul Malvino and Donald P. Leach – Digital Principles and Applications
2. Roger L. Tokheim Macmillan – Digital Electronics – McGraw – Hill –1994.
3. William H.Goth Mann – Digital Electronics – An introduction to theoryand practice – PHI 1998.
4. Linear integrated circuits byB.Suseela&T.R.Ganeshbabu -Scitech publications-2018
5. Integrated circuits by K.R.Botkar-Khanna publisher's-1996.
- 6.D.Roychoudhury&shail. B.Jain- Linear Integrated Circuits -New age International publishers - II Edition -2004.
- 7.R.P.Jain – Modern Digital Electronics – TMH 2003.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS
N-SCHEME

(To be Implemented for the students admitted from the year 2020 - 2021 onwards)

Course Name : 1040:Electronics and Communication Engineering
 Course Code : 4040440
 Semester : IV Semester
 Subject Title : INDUSTRIAL ELECTRONICS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
			Internal Assessment	Board Examinations	Total	
INDUSTRIAL ELECTRONICS PRACTICAL	5	80	25	100*	100	3 Hrs.

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

RATIONALE:

The rationale behind the modifying this subject is to give clear explanation of power devices and circuits that are widely used today in modern industry. It also gives exposure to PLCs & Inverters which can perform various control functions in industrial environments.

OBJECTIVES:

- All the experiments given in the list of experiments should be completed and given for the endSemester practical examination.
- In order to develop best skills in handling Instruments/Equipment and taking readings in the practicalclasses, every three students should be provided with a separate experimental setup for doingexperiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than three students while admitting a batch of 30 students during Board Examinations.

4040440 INDUSTRIAL ELECTRONICS PRACTICAL

DETAILED SYLLABUS

Contents:Practical

Exercises

1. Phase control characteristics of SCR and testing a commutation circuit.
2. Construct a Lamp dimmer using TRIAC (in Bread Board Only)
3. Construct and test a MOSFET based PWM chopper circuit
4. Construct and test an IC based buck converter using PWM
5. Write and implement a simple ladder logic program using digital inputs and outputs for PLC
6. Write and implement a simple ladder logic program for interfacing a lift control with PLC.
7. Write and implement a simple ladder logic program for interfacing a conveyer control with PLC.
8. Write and implement a simple ladder logic program using timer and counter with branching and subroutines with PLC.
9. Construct and draw the VI characteristics of IGBT.
10. Construct and draw the VI characteristics of Power MOSFET.
11. Construct and draw single phase half controlled bridge converter with resistive load.
12. Construct and design a fan regulator using TRIAC and DIAC.

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

CIRCUIT DIAGRAM	: 25
CONNECTION	: 25
EXECUTION & HANDLING OF EQUIPMENT	: 25
OUTPUT / RESULT	: 15
VIVA – VOCE	:10

TOTAL : 100

MODEL QUESTION PAPER

4040440 INDUSTRIAL ELECTRONICS PRACTICAL

- 1 Phase control characteristics of SCR and testing a commutation circuit.
2. Construct a Lamp dimmer using TRIAC (in Bread Board Only)
3. Construct and test a MOSFET based PWM chopper circuit
4. Construct and test an IC based buck converter using PWM
5. Write and implement a simple ladder logic program using digital inputs and outputs for PLC
6. Write and implement a simple ladder logic program for interfacing a lift control with PLC.
7. Write and implement a simple ladder logic program for interfacing a conveyer control with PLC
8. Write and implement a simple ladder logic program using timer and counter with branching and subroutines with PLC..
9. Construct and draw the VI characteristics of IGBT.
10. Construct and draw the VI characteristics of Power MOSFET.
11. Construct and draw single phase half controlled bridge converter with resistive load.
12. Construct and design a fan regulator using TRIAC and DIAC.

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LIST OF EQUIPMENTS

S.NO	Name of the Equipment	Range	Required Nos
1	Regulated Power supply	0-30v	5
2	Dual trace CRO	-	2
3	Signal generator	-	2
4	PAM kit	-	1
5	Pcm kit	-	1
6	PLC's	-	5
7	Computers	-	5
8	Software For PLC	-	-
9	Multimeter		10

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS
N-SCHEME

(To be Implemented for the students admitted from the year 2020 - 2021 onwards)

Course Name : 1040 : Electronics and Communication Engineering

Subject code : 4040450

Semester : IV

Subject title : COMMUNICATION ENGINEERING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No. of weeks/ Semester: 16 weeks

Subject	Instruction		Examination			Duration
	Hours /week	Hours /semester	Marks			
			Internal Assessment	Board Examination	Total	
Communication Engineering Practical	4	64	25	100*	100	3 Hours

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

RATIONALE:

Every Electronics Engineer should have sound knowledge about the components used in Electronics Industry. This is vital in R&D Department for chip level troubleshooting. To meet the telecommunication industrial needs, diploma holders must be taught about the fundamental subject, Communication Engineering Practical. By doing practical experience in this, they will be skilled in handling all types of Communication circuits and able to apply the skill in trouble shooting of Audio and Video Systems and all electronic systems in various applications.

OBJECTIVES:

On completion of the following experiments, the students must be able to understand the concept, working principle and applications of all Analog and Digital modulation techniques and all types of transmitters.

4040450 COMMUNICATION ENGINEERING PRACTICAL

DETAILED SYLLABUS

Contents: Practical

Exercises

Note: At least 5 experiments should be constructed using breadboard /soldering

1. Construct and test the performance of symmetrical T and π attenuators
2. Construct and test the performance of passive Low pass and High pass filters. Find out the cut-off frequency from the frequency response characteristics
3. Construct and test the performance of Band pass filter. Find out the cut-off frequencies and find the Bandwidth from the frequency response characteristics
4. Construct and test the performance of series and shunt equalizers.
5. Construct and test the performance of Amplitude modulator
6. Construct and test the performance of AM linear diode detector.
7. Construct and test the performance of Pulse Width Modulator (PWM)
8. Construct and test the performance of Pulse Position Modulator (PPM)
9. Determine the directional characteristics of Moving Coil Microphone.
10. Determine the directional characteristics of Dynamic cone Loudspeaker
11. Determine the frequency response characteristics of Two way cross over network
12. Design the PCB of AM modulator using simulation tools like Multisim/OrCAD

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

CIRCUIT DIAGRAM	:	25
CONNECTION	:	25
EXECUTION & HANDLING OF EQUIPMENT	:	25
OUTPUT / RESULT	:	15
VIVA – VOCE	:	10
TOTAL	:	100

MODEL QUESTION PAPER

4040450 COMMUNICATION ENGINEERING PRACTICAL

Note: At least 5 experiments should be done using Soldering board / Bread board

1. Construct and test the performance of symmetrical T and π attenuators
2. Construct and test the performance of passive Low pass and High pass filters. Find out the cut-off frequency from the frequency response characteristics
3. Construct and test the performance of Band pass filter. Find out the cut-off frequencies and find the Bandwidth from the frequency response characteristics
4. Construct and test the performance of series and shunt equalizers.
5. Construct and test the performance of Amplitude modulator
6. Construct and test the performance of AM linear diode detector.
7. Construct and test the performance of Pulse Width Modulator (PWM)
8. Construct and test the performance of Pulse Position Modulator (PPM)
9. Determine the directional characteristics of Moving Coil Microphone.
10. Determine the directional characteristics of Dynamic cone Loudspeaker
11. Determine the frequency response characteristics of Two way cross over network
12. Design the PCB of AM modulator simulation tools like Multisim /OrCAD

LIST OF EQUIPMENTS

S.NO	Name of the Equipment	Range	Required No.
1.	Regulated Power Supply	0 – 30V	10
2.	Dual trace CRO	60 MHz	5
3.	Signal Generator	-	10
4.	Desk Top Computer	-	2
5.	Decade Resistance Box	0 - 100KOhm	5
6.	Decade Capacitance Box	0 - 100uF	5
7.	Decade Inductance Box	0 - 10H	5
8.	Dynamic cone Loud speaker	-	2
9.	Moving coil Microphone	-	1
10.	Velocity Ribbon Micro phone	-	1
11.	Software Tool	Multisim/OrCAD	

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS
N-SCHEME

(To be Implemented for the students admitted from the year 2020 - 2021 onwards)

Course Name : 1040:Electronics and Communication Engineering
Subject code : 4040460
Semester : IV
Subject title : ANALOG AND DIGITAL ELECTRONICS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No. of weeks/ Semester: 16 weeks

Subject	Instruction		Examination			
	Hours /week	Hours /semester	Internal Assessment	Board Examination	Total	Duration
Analog and Digital Electronics Practical	5	80	25	100*	100	3 Hours

* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

RATIONALE:

Every Electronic Engineers should have sound knowledge about the ICs used in Electronics Industry. This is vital in R&D Department for Chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental subject, Analog and Digital Electronics Practical. By doing practical experience in this, they will be skilled in handling all types of ICs and able to apply the skill in electronic system design and the designing of PCBs.

OBJECTIVES:

On completion of the following experiments, the students must be able to

- Know the Verification of truth table of OR, AND, NOT, NOR, NAND, EX-OR gates
- Know the Realization of basic gates using NAND & NOR gates.

- Know the verification of Half Adder and Full Adder using IC's.
- Know the verification of Half Subtractor and Full Subtractor using IC's.
- Know the Verification of Truth Table for Decoder/Encoder.
- Know the Verification of truth table for RS, D, T & JK flip-flop.
- Test Inverting Amplifier and Non inverting amplifier using Op-amp
- Test Summing Amplifier, Difference Amplifier and Voltage Comparator using Op-amp.
- Test Integrator and Differentiator.
- Test Astablemultivibrator using IC 555
- Design IC Voltage Regulator Power Supplies using IC 7805, IC 7912
- Design the PCB of 4-bit ripple counter using FF

4040460 ANALOG AND DIGITAL ELECTRONICS PRACTICAL
DETAILED SYLLABUS

Contents: Practical

Exercises

Note: At least 6 experiments should be constructed using breadboard

1. Realization of basic gates using NAND & NOR gates.
2. Realization of logic circuit for De-Morgans Theorems
3. Test the performance of Half Adder and Full Adder.
4. Test the performance of Half Subtractor and Full Subtractor.
5. Test the performance of Decoder/Encoder.
6. Test the performance of RS, D, T & JK flip-flops.
7. Test the performance of Parity generator and checker using parity checker/ generator IC's.
8. Test the performance of Multiplexer/De-multiplexer using IC 4051
9. Test the performance of Inverting Amplifier and Non inverting amplifier using Op-amp IC 741.
10. Test the performance of Summing Amplifier, Difference Amplifier.
11. Test the performance of Zero Crossing Detector and Voltage Comparator using Op-amp IC 741.
12. Test the performance of Integrator and Differentiator using Op-amp IC 741.
13. Test the performance of Astablemultivibrator using IC 555.
14. Test the performance of IC Voltage Regulator Power Supplies using IC 7805, IC 7912.

15. Design the PCB of 4-bit ripple counter using FF using Software tool Multisim/OrCAD etc

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

CIRCUIT DIAGRAM	:	25
CONNECTION	:	30
EXECUTION & HANDLING OF EQUIPMENT	:	20
OUTPUT / RESULT	:	15
VIVA – VOCE	:	10
TOTAL	:	100

MODEL QUESTION PAPER

4040460 ANALOG AND DIGITAL ELECTRONICS PRACTICAL

Note: At least 6 experiments should be done using Bread board

1. Realization of basic gates using NAND & NOR gates.
2. Realization of logic circuit for De-Morgans Theorems.
3. Test the performance of Half Adder and Full Adder.
4. Test the performance of Half Subtractor and Full Subtractor..
5. Test the performance of Decoder/Encoder.
6. Test the performance of RS, D, T & JK flip-flops.
7. Test the performance of Parity generator and checker using parity checker/ generator IC's.
8. Test the performance of Multiplexer/De-multiplexer using IC 4051.
9. Test the performance of Inverting Amplifier and Non inverting amplifier using Op-amp IC 741.
10. Test the performance of Summing Amplifier, Difference Amplifier.
11. Test the performance of Zero Crossing Detector and Voltage Comparator using Op-amp IC 741.
12. Test the performance of Integrator and Differentiator using Op-amp IC 741.
13. Test the performance of Astable multivibrator using IC 555.

14. Test the performance of IC Voltage Regulator Power Supplies using IC 7805, IC 7912.

15. Design the PCB of 4-bit ripple counter using FF using Software tool Multisim/OrCAD etc.

LIST OF EQUIPMENTS

S NO	Name of the Equipments	Range	Required Nos
1	DC Regulated power supply	0-30V, 1A	5
2	IC Voltage Power Supply	0-5V, 1A 15-0-15V, 1A	5 5
3	Signal Generator	1MHz	4
4	Dual trace CRO	20MHz/ 30MHz	5
5	Digital Trainer	-	10
6	DC Voltmeter (Analog/Digital)	Different Ranges	5
7	DC Ammeter (Analog/Digital)	Different Range	5
8	Desk Top Computer	-	5
9	Simulation Tool	Multisim/OrCAD	1

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS
N-SCHEME

(To be Implemented for the students admitted from the year 2020 - 2021 onwards)

Course Name : 1020 : Mechanical Engineering
Subject Code : 4020620
Semester : VI
Subject Title : E Vehicle Technology & Policy

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
Internal Assessment			Board Examinations	Total		
4020620 E Vehicle Technology & Policy	4	64	25	100*	100	3 Hrs.

* Examination will be conducted for 100 marks and it will be reduced to 75 marks for result.

Topics and Allocation of Hours

Unit	Topics	Hours
I	Environmental impact and history & Electric vehicle Types	12
II	Electric vehicle & Drive System	12
III	Energy Storages, Charging System, Effects and Impacts	11
IV	Electric Mobility Policy Frame Work	11
V	Tamilnadu E-Vehicle Policy 2019	11
Test And Revision		7
Total		64

RATIONALE:

The world is transitioning to cleaner mobility options with the aim at improving air quality and reducing dependency on fossil fuels. Electric Vehicles (EVs) have emerged a popular clean mobility choice to reduce emissions. EVs are powered fully or partially by batteries, they can help to reduce dependence on fossil fuels also air quality. Tamil Nadu is one of the most advanced states in India. Tamil Nadu has a highly developed industrial eco-system and is very strong in sectors like automobiles and auto-components. Many globally renowned companies have setup their manufacturing facilities in Tamil Nadu. Due the rapid depletion of fossil fuel and increase in fuel cost, environmental pollution, the shift to clean transport is necessary. This subject introduced by keeping all the above factors.

OBJECTIVES:

- To learn the environmental impact and history of Electric Vehicles.
- To understand the concept of Electric Vehicle and its types.
- To study the configurations of Electric Vehicles
- To acquire knowledge about Energy Storages, Charging System, Effects and Impacts
- To appreciate the Electric Mobility Policy Frame work India and EV Policy Tamil Nadu 2019.

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4020620 E Vehicle Technology & Policy

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	<p>Environmental impact and history: Environmental impact of conventional vehicle - Air pollution – Petroleum resources – History of Electric vehicles & Hybrid Electric Vehicles - Conventional drive train system – Rear Wheel, Front Wheel and All wheel - Parts of Drive train system</p> <p>Electric vehicle Types: Introduction to Battery Electric Vehicle (BEV) – Definition BEV – Necessity BEV – Different between BEV and Conventional Vehicle - Advantages of BEV - Block diagram of BEV – Hybrid electric Vehicle (HEV) - Plug-in Hybrid Electric Vehicle (PHEV) – Fuel Cell Electric Vehicle (FCEV) – Description.</p>	12
II	<p>Electric Vehicles: Configurations of Electric Vehicle – Performance of Electric Vehicles – Tractive Effort in Normal Driving – energy consumption. Hybrid Electric Vehicles: Concept of Hybrid electric drive trains – Architecture of Hybrid Electric Drive trains – Series, Parallel and Series & Parallel</p> <p>Electric Propulsion Systems: Types of EV motors - DC motor drives– Permanent Magnetic Brush Less DC Motor Drives (BLDC) – Principles, Construction and Working – Hub motor Drive system – Merits and Demerits of DC motor drive, BLDC motor drive</p>	12
III	<p>Energy Storages: Electrochemical Batteries – Battery Technologies – Construction and working of Lead Acid Batteries, Nickel Based Batteries and Lithium Based Batteries Role of Battery Management System (BMS)– Battery pack development Technology– Cell Series and Parallel connection to develop battery pack.</p> <p>Charging:</p>	11

	<p>Battery Charging techniques - Constant current and Constant voltage, Trickle charging – Battery Swapping Techniques – DC charging – Wireless charging – Maintenance of Battery pack – Latest development in battery chemistry.</p> <p>Effects and Impacts: Effects of EV – Impacts on Power grid – Impacts on Environment – Impacts on Economy.</p>	
IV	<p>Electric Mobility Policy Frame Work</p> <p>Government of India Electric Mobility Policy Frame work – Global Scenario of EV adoption – Electric mobility in India – National Electric Mobility Mission Plan 2020 – Action led by Original Equipment Manufacturers – Need of EV Policy – Advantage of EV Eco system – Scope and Applicability of EV Policy – ARAI Standards for Electric Vehicle – AIS 038, AIS 039 & AIS 123 - Key Performance Indicator - Global impact – Trends and Future Developments</p>	11
V	<p>Tamil Nadu E-Vehicle Policy 2019</p> <p>Tamil Nadu E-vehicle Policy 2019: Vehicle Population in Tamil Nadu – Objectives of EV Policy – Policy Measures – Demand side incentives – Supply side incentives to promote EV manufacturing – Revision of Transport Regulation of EV – City building codes – Capacity Building and Skilling – Charging structure – implementing agencies – R&D and Business Incubation – Recycling Ecosystem – Battery and EVs</p>	11

Reference Books

1. Modern Electric, Hybrid Electric and Fuel Cell Vehicles, Mehrdad Ehsani, Yimin Gao, Sebastien E.Gay, Ali Emadi, CR Press, London, New York.
2. Comparison of Electric and Conventional Vehicles in Indian Market: Total Cost of Ownership, Consumer Preference and Best Segment for Electric Vehicle (IJSR), Akshat Bansal, Akriti Agarwal
3. A Comprehensive Study of Key Electric Vehicle (EV) Components, Technologies, Challenges, Impacts, and Future Direction of Development (MDPI), Fuad Un-Noor, SanjeevikumarPadmanaban, Lucian Mihet-Popa, Mohammad NurunnabiMollah and Eklas Hossain.
4. Electric Vehicles: A future Projection CII October 2020 report.
5. Design and analysis of aluminum/air battery system for electric vehicles, Shaohua Yang, Harold Knickle, Elsevier.

6. Propelling Electric Vehicles in India, Technical study of Electric Vehicles and Charging Infrastructure
7. ZERO EMISSION VEHICLES (ZEVs): TOWARDS A POLICY FRAMEWORK – NTI Aayog.
8. FASTER ADOPTION OF ELECTRIC VEHICLES IN INDIA: PERSPECTIVE OF CONSUMERS AND INDUSTRY, The Energy and Resources Institute, New Delhi.
9. India EV Story: Emerging Opportunities by Innovation Norway.
10. Automotive Industry Standards – AIS 038, AIS 039 & AIS 123 – Manual

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