SANKAR POLYTECHNIC COLLEGE (AUTONOMOUS)

SANKAR NAGAR

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

M-SCHEME (Full Time)

II and III year

2016 onwards

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM OUTLINE
Diploma in Electronics and Communication Engineering (Full Time)
III Semester

Subject Code	Subject	Hours Per Week			
		Theory Hours	Tutorial / Drawing	Lab Hours	Total Hours
M431	Electronic Devices and Circuits	5	1	-	6
M432	Digital Electronics	5	1	-	6
M433	Electrical Circuits and Instrumentation	5	1	-	6
M434	Electronic Devices and Circuits Lab	-	-	4	4
M435	Digital Electronics Lab	-	-	4	4
M436	Electrical Circuits and Instrumentation Lab	-	-	4	4
M437	Computer Application Lab	-	-	4	4
	Seminar		1		1
				Total	35

IV Semester

Subject Code	Subject	Hours Per Week			
		Theory Hours	Tutorial / Drawing	Lab Hours	Total Hours
M441	Communication Engineering	5	1	-	6
M442	Microprocessors	5	1	-	6
M443	Linear Integrated Circuits	5	1	-	6
M444	Programmable Logic Controller	4	-	-	4
M445	Microprocessors Lab	-	-	4	4
M446	Linear Integrated Circuits Lab	-	-	4	4
M447	Life And Employability Skill Lab*	-	-	4	4
	Seminar		1		1
				Total	35

* → Common to all branches

V Semester

Subject Code	Subject	Hours Per Week			
		Theory Hours	Tutorial / Drawing	Lab Hours	Total Hours
M451	Advanced Communication Systems	5	1	-	6
M452	Microcontroller	5	1	-	6
M453	VLSI Principles	5	1	-	6
M454x	Elective Theory – I a) Bio Medical Instrumentation b) Electronic System design c) Robotics	4	-	-	4
M455	Communication Systems Lab	-	-	4	4
M456	Micro controller Lab	-	-	4	4
M457	VLSI Lab	-	-	4	4
	Seminar		1		1
				Total	35

Elective subjects

Any one of the following theory subject may be selected as Elective – I

Elective Theory – I	
M4541	Bio Medical Instrumentation
M4542	Electronic System design
M4543	Robotics

VI Semester

Subject Code	Subject	Hours Per Week			
		Theory Hours	Tutorial / Drawing	Lab Hours	Total Hours
M461	Industrial Electronics	5	1	-	6
M462	Embedded System	5	1	-	6
M463x	Elective Theory – II a) Data Communication b) C Programming c) Computer Hardware and Network	5	1	-	6
M464	Embedded System Lab	-	-	4	4
M465	Industrial Electronics Lab	-	-	4	4
M466x	Elective Lab a) Robotics Lab b) C Programming Lab c) Computer Hardware and Test Engineering Lab	-	-	4	4
M467	Project Work	-	-	4	4
	Seminar		1		1
				Total	35

Elective subjects

Any one of the following theory subject with the corresponding Lab may be selected as Elective – II

Elective Theory – II		Elective Lab – II	
M4631	Data Communication	M4661	Robotics Lab
M4632	C Programming	M4662	C Programming Lab
M4633	Computer Hardware and Network	M4663	Computer Hardware and Test Engineering Lab

SCHEME OF EXAMINATION

ELECTRONICS AND COMMUNICATION ENGINEERIING

THIRD SEMESTER

Sl. No	Subject	End Examination Marks				
		Internal Marks	End Examinations	Total Marks	Minimum for Pass	Duration of Exam Hours
M431	Electronic Devices and Circuits	25	75	100	40	3
M432	Digital Electronics	25	75	100	40	3
M433	Electrical Circuits and Instrumentation	25	75	100	40	3
M434	Electronic Devices and Circuits Lab	25	75	100	50	3
M435	Digital Electronics Lab	25	75	100	50	3
M436	Electrical Circuits and Instrumentation Lab	25	75	100	50	3
M437	Computer Application Lab	25	75	100	50	3
	Total	175	525	700		

FOURTH SEMESTER

Sl. No	Subject	End Examination Marks				
		Internal Marks	End Examination	Total Marks	Minimum for Pass	Duration of Exam Hours
M441	Communication Engineering	25	75	100	40	3
M442	Microprocessors	25	75	100	40	3
M443	Linear Integrated Circuits	25	75	100	40	3
M444	Programmable Logic Controller	25	75	100	40	3
M445	Microprocessors Lab	25	75	100	50	3
M446	Linear Integrated CircuitsLab	25	75	100	50	3
M447	Life And Employability Skill Lab	25	75	100	50	3
	Total	175	525	700		

FIFTH SEMESTER

Sl. No	Subject	End Examination Marks				
		Internal Marks	End Examinations	Total Marks	Minimum for Pass	Duration of Exam Hours
M451	Advanced Communication Systems	25	75	100	40	3
M452	Microcontroller	25	75	100	40	3
M453	VLSI Principles	25	75	100	40	3
M454x	Elective Theory – I	25	75	100	40	3
M455	Communication Systems Lab	25	75	100	50	3
M456	Micro controller Lab	25	75	100	50	3
M457	VLSI Lab	25	75	100	50	3
	Total	175	525	700		

SIXTH SEMESTER

Sl. No	Subject	End Examination Marks				
		Internal Marks	End Examinations	Total Marks	Minimum for Pass	Duration of Exam Hours
M461	Industrial Electronics	25	75	100	40	3
M462	Embedded System	25	75	100	40	3
M463x	Elective Theory – II	25	75	100	40	3
M464	Embedded System Lab	25	75	100	50	3
M465	Industrial Electronics Lab	25	75	100	50	3
M466x	Elective Lab	25	75	100	50	3
M467	Project Work	25	75	100	50	3
	Total	175	525	700		

M SCHEME

(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 431**

Semester: **III**

Subject Title: **ELECTRONIC DEVICES AND CIRCUITS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Electronic Devices And Circuits	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Semiconductor and diodes	15
II	Bipolar and unipolar Transistor	16
III	Power and Opto devices	14
IV	Amplifiers and Voltage regulators	15
V	Oscillators and wave shaping circuits	15
Revision and Test		15
Total		90

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 industrial needs, diploma holders must be taught about the most fundamental subject, Electronic devices and Circuits. By studying this subject, they will be skilled in handling all types of electronic devices and able to apply the skill in electronics system.

OBJECTIVES:

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

- Study the working principle of PN junction diode and transistor
- Understand the working principle of different types of rectifiers, different transistor configurations and differentiate various types of amplifiers
- Study the performance of special devices like UJT, FET

- Study the performance of different transistor oscillators
- Study the performance of SCR, DIAC, and TRIAC
- Study the performance and types of MOSFET
- Study the performance of Power Amplifier
- Study the different modes of operations of MOSFET
- Know the construction and working principle of optoelectronic devices
- Study the performance of solar cell with principle and applications
- Explain the concept of wave shaping circuits
- Study the working principle of clippers and clampers

M– 431 ELECTRONIC DEVICES AND CIRCUITS

Unit – I Semiconductor and Diodes:

Resistors:

Types of resistor –Fixed (carbon type construction only)–Variable –POT – Rheostat – Preset – Colour coding - Tolerance of resistors

Semi conductor Theory:

Atomic structure of silicon and germanium – energy level and energy band – classification based on energy band diagram –electron hole pair generation – intrinsicand extrinsic semiconductors – majority and minority carriers.

PN Junction Diode:

PN Junction diode – Forward and Reverse bias characteristics – Specifications

Zener diode:

Construction & working principle – Characteristics – Zener break down – Avalanche break down.

Rectifier:

Introduction – Classification of Rectifiers – Half Wave Rectifier – Full Wave Rectifier – Bridge Rectifier – Definition and values for Efficiency and Ripple factor (Only Definition and No mathematical derivations)–Comparison - Applications – Filters – C, LC and PI Filters.

Unit – II Bipolar and unipolar Transistor

Transistor:

NPN and PNP transistor – operation –CB, CE, CC Configurations – Characteristics – cut off and saturation – Comparison between three configurations in terms of input impedance, output impedance, current gain, voltage gain–Transistor as a switch.

Field Effect Transistor:

Construction – Working principle of FET – Difference between FET and BJT – Characteristics of FET.

MOSFET:

Construction and Characteristics (N channel depletion and enhancement modes only)– Comparison between D and E MOSFET –MOSFET as a Switch

UJT:

Construction – Equivalent circuit – Operation – characteristics –UJT as relaxation oscillator.

Unit – III Power and Opto devices

SCR:

Introduction – Working – Two transistor analogy of SCR – VI characteristics – SCR as a Switch, Controlled rectifier.

DIAC:

Construction – Working – Characteristics – Diac as bi–directional switch**.**

TRIAC:

Basic working principle – Characteristics – Speed control of fan using Diac and Triac

Opto Devices:

LDR, LED, 7 segment LED, LCD, Opto coupler, Opto interrupter – Laser diode(simple treatment) –Solar cell – Photo diode – Photo transistor – IR LED and IR Sensor.

Unit – IV Amplifiers and Voltage regulators

Regulator:

Zener diode voltage regulator – Transistor regulators – Series and shunt

Transistor biasing:

Need for Biasing – Fixed bias, Collector to base bias, Self bias

Amplifiers:

Small signal amplifier: Transistor Amplifier (Common Emitter) –frequency response and bandwidth of amplifier - RC coupled amplifier – Types of feedback–Negative feedback – Basic concept, advantages –Comparison between negative and positive feedback - Emitter follower and its application–Darlington pair– Common source amplifier.

Large signal amplifier:classification of power amplifiers – Working principle of Class B push pull amplifier

Unit –V Oscillators and wave shaping circuits

Oscillator:

Classifications – Condition for Oscillation (Barkhausencritierion) – General form of LC Oscillator – Hartley Oscillator – Colpitts Oscillator – RC Phase shift Oscillator – Crystal oscillator

Wave shapping circuits:

Diode Clipper and Clamper, Voltage Doubler –Astable, Monostable and BistableMultivibrators using Transistor.

Reference Books:

1. Electronic Devices and Circuits by Boylstead, Tata McGraw Publication
2. Principle of Electronics by V.K.Mehta, S.Chand& Company ltd.
3. Electronics Devices & Circuits by Salivahanan, N.Suresh Kumar, A.Vallavaraj

Tata McGraw Publication
4. Electronics principles by Malvino, Tata McGraw Publication

M SCHEME

(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 432**

Semester: **III**

Subject Title: **DIGITAL ELECTRONICS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Digital Electronics	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Logic gates and Boolean Algebra	17
II	Arithmetic and Combinational Logic Circuits	15
III	Sequential Logic circuits	15
IV	Memory and display	14
V	CPU design	14
Revision and Test		15
Total		90

RATIONALE:

The subject of Digital Electronics holds applications in all branches of engineering. This subject will impart in depth knowledge of Number systems, Logics of Combinational & Sequential circuits and also about various micro operations followed in ALU. The concept of Digital Electronics will be implemented in all processor.

OBJECTIVES:

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

- To understand various Number System.
- To understand basic Boolean postulates and laws.
- To understand the concept of Karnaugh Map.
- To Learn about Basic logic Gates.
- To learn the different digital logic families
- To learn arithmetic circuits-adder/subtractor, BCD adder.
- To understand the encoder/decoder & MUX / DEMUX

- To understand various types of flip-flops.
- To understand various types of counters.
- To understand various modes of shift registers
- To understand the concept of RAM & ROM and its types.
- To know the internal structure of ALU
- To learn arithmetic, logical and shift micro operations of CPU
- To know a thorough knowledge about one stage ALU with system buses

M 432 - DIGITAL ELECTRONICS

Unit - I Logic gates and Boolean Algebra

Review of Number systems:

Representation of data in Binary, Hexadecimal, and BCD – Conversion from each to decimal and vice versa - Gray code, Excess 3 code and ASCII code (concept only)

Logical gates:

Representation of positive and negative logic - Logic gates – Definition, symbol, truth table, logic equation and operation of AND, OR, NOT, NAND, NOR and EX- OR gates - Realization of basic gates using universal gates - Tristate and Bi directional buffers.

Boolean Algebra:

Concepts – Basic Boolean laws - Demorgan's Theorems – Simplification of Boolean expressions using Boolean laws - Simplification of Boolean expressions using Karnaugh Map (Problems in 3 and 4 variables only) – QuineMcCluskey method (Principle only – No problems) - Construction of logic circuits for the Boolean expressions.

Digital logic families:

TTL - Basic NAND gate operation – open collector – pull up and pull down resistor – Basic NAND gate operation in CMOS – TTL to CMOS and CMOS to TTL Interfacing.

Unit - II Arithmetic and Combinational Logic

Binary arithmetic: 1's and 2's Complement representation –binary addition and subtraction (simple problems) – subtraction using 2's complement and 1's complement addition (simple problems)

Arithmetic circuits:

Circuit, symbol, truth table and working principle of Half adder,Full adder, Half subtractor, and Full subtractor (one bit) – Magnitude comparator

Combinational circuits:

Definition, Circuit diagram, symbol, truth table and working principle for 8 to 1 Multiplexor – Implementation of Boolean expressions using MUX (Simple Problems in 3 and 4 variables only)- 3 X 8 Decoder,BCD to Seven segment decoder, octal to binary Encoder, 1 to 8 Demultiplexor, Parity Generator and checker.

Unit - III Sequential Logic circuits

Flip-flops:

Circuit, symbol, truth table and working principle of RS , D , T , JK, JK Master Slave Flip Flops.

Triggering – Edge triggering and level triggering (Definition only)

Counters: Block diagram, operation, truth table, working principle and waveform of 4 bit Binary Ripple asynchronous up, down, up –down Counters – 4 bit binary synchronous up counter - Decade counter – Mod N counters – Ring counter and Johnson counter.

Shift registers:
Definition – types – Block diagram – Working principle of 4 bit shift register.

Unit - IV Memory and display

ROM:
Types of Memories – ROM – PROM – EPROM – UVEPROM – Flash memory – Organization of ROM – Anti fuse Technologies

RAM:
READ and WRITE operations – Types of RAM – Static RAM – Dynamic RAM – Circuit diagram and working principle – Organization of a RAM cell – Expanding memory(8K and 16 K).
Associate memory – Cache memory and virtual memory (concepts only)

Display circuits:
latched display – multiplexed display

Unit - V CPU design

Concept of Micro operations:(short description only)
Register transfer language – Register transfer – Bus transfer

Arithmetic micro operations:
4 bit serial and parallel adder, BCD Adder - incrementer – 8 function arithmetic circuit – block diagram and working principle

Logical micro operations:
Circuit and principle of 16 function logic circuit - Shifter circuits using combinational logic

ALU:
Block diagram and working of one stage Arithmetic Logic and Shift unit - ALU with register organization.

Reference Books:
1. R.P. Jain – Digital Principles and Modern Digital Electronics – TMH 2003.
2. Albert Paul Malvino and Donold P. Leach – Digital Principles and applications – TMH – 1991.
3. Thomas L. Floyd, Digital Fundamentals, Pearson Education, Inc, New Delhi, 2003
4. V.K.Puri – Digital Electronics circuits and systems – TMH

M SCHEME

(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 433**

Semester: **III**

Subject Title: **ELECTRICAL CIRCUITS AND INSTRUMENTATION**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Electrical Circuits And Instrumentation	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	D.C. Circuits and Theorems	16
II	A.C. Circuits and Resonance	14
III	Transformers and Machines	15
IV	Measuring Instruments and CRO	16
V	Recorders and Transducers	14
Revision and Test		15
Total		90

RATIONALE:

This subject enables the students with concepts of DC, AC circuits and fundamentals of Electrical Machines. The subject also deals with concepts, principles and working of analog and digital electronic measuring instruments. The introduction of this subject will enable the students to be well exposed to a wide area of various electronic measuring instruments and a thorough knowledge of the fundamentals of electrical circuits.

OBJECTIVES:

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

- To study ohm's law and Kirchhoff' s laws.
- To study the circuit theorems
- To learn about series and parallel Circuits.

- To learn various terms related to AC circuits.
- To understand concept of AC circuits
- To learn about series and parallel resonance circuits.
- To study about transformer and its working.
- To understand the working of DC machine.
- To know about Induction motors and stepper motor.
- To understand the basic measuring instruments.
- To learn about bridge circuits.
- To discuss about CRO and its types.
- To learn about transducers and its various types.
- To study about sensors.
- To know about various types of recorders and their functions.

M- 433 ELECTRICAL CIRCUITS AND INSTRUMENTATION

Unit – I D.C. Circuits and Theorems

Definition and unit for voltage, current, power, resistance, conductance, resistivity – ohm's law – only simple problems in ohm's law- Kirchoff's current law and voltage law (Only simple problems in KVL and KCL).

Series circuits –parallel circuits – series parallel circuits – Thevenin's, Norton's, super position and maximum power transfer theorem – Statement and explanation (simple problems – two sources with four resistors)

Unit – II A.C. Circuits and Resonance

Voltage and Current relationship in the resistance, inductance and capacitance: AC through single pure resistance, pure inductance, pure capacitance –The equation for power and power factor in each case (only simple problems) – Energy stored in Inductor and capacitor - Definition for impedance, reactance, admittance, conductance, phase angle, power factor and power.

Three phase supply – star and delta connection diagrams (only concept and no problems)

AC circuits – Derivation only for impedance, power and power factor in Series R-L ,R-C ,R-L-C circuits. –Analysis of Parallel R-L circuit, R-C circuit, R-LC circuit (qualitative treatment only).

Resonance series resonance – parallel resonance - condition for resonance – resonant frequency- Q factor - resonance curve - bandwidth (only simple problems).

Unit – III Transformers and Machines

Transformer – Ideal transformer – construction - working principle –EMF equation - Losses in transformer- core loss, copper loss- Efficiency- Regulation- OC, SC test on transformer -List of applications (qualitative treatment only)

D.C. Machines - DC–Generator –Working principle - Types- Applications - DC motor-working principle - types-applications (qualitative treatment only)

Single phase Induction motor-Types- construction & principle of operation of capacitor start induction motor- Applications- stepper motor-working principle-uses (qualitative treatment only).

Unit – IV Measuring Instruments and CRO

Indicating instruments – Basic forces for indicating instruments-construction and operation of permanent magnet moving coil Instrument-Advantages –Disadvantages of PMMC -Shunts and Multipliers– DC ammeter-DC volt meter-volt meter sensitivity - Schematic Diagram of a Multi meter for DC current, DC voltage, AC current, AC voltage.

CRO: Block diagram and principle of operation of CRO- operation of CRT -Electrostatic focusing- Electrostatic deflection (no derivation)- Block diagram of vertical deflection system- Applications of CRO – Types of CRO- Block diagram and operation of dual trace CRO- dual beam CRO –comparison between dual trace and dual beam CRO – Digital storage oscilloscope –Block diagram- advantages.

Unit – V Recorders and Transducers

Bridges- Types - Wheat stone bridge - applications -Universal impedance bridge arrangements to measure R, L, C -Wein bridge for frequency measurement

Recorders – Types- X-Y recorder –Strip chart recorder – principle of operation and applications - comparison between X-Y recorder and strip chart recorder

Transducers –classification of transducer -- Strain gauge - Types-uses. Construction, operation and applications of capacitive, inductive, photo electric transducer, LVDT and Load cell. Principle of working of Thermocouple-- Temperature measurement using thermocouple – list of applications- Principle of working of Thermistor –Temperature measurement using thermistors – Types (NTC, PTC) – List of applications .

REFERENCE BOOKS:

1. Electric Circuit theory – Dr. M. Arumugam and N. Premkumar
2. A text book of Electrical Technology by B.L. Theraja, Publication Division of Nirja constructions and development co. (P) Ltd., - 1994.
3. Modern Electronic Instrumentation and Measurements Techniques –Albert d. Helfrick and William David Cooper-PHI
4. Electrical & Electronic - Measurements & Instrumentation –Sawheney, Dhanpatrai& son

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 434**

Semester: **III**

Subject Title: **ELECTRONIC DEVICES AND CIRCUITS LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Electronic Devices And Circuits Lab	4	90	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Circuit Diagram	35
2	Connection	10
3	Execution and Equipment handling	15
4	Result and Graph	10
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	DC Regulated power supply	0-30V, 1A	8
2	High Voltage Power Supply	0-250V, 1A	2
3	Signal Generator	1MHz	4
4	Dual trace CRO	20 MHz / 30MHz	5
5	Digital Multi meter	---	8
6	DC Voltmeter (Analog/Digital)	Different Ranges	8
7	DC Ammeter (Analog/Digital)	Different Ranges	8

8	Computers for Simulation Experiments	---	3
9	Software – PSPICE / Multi Sim / ORCAD / Tina	----	(Any 1)

M434 - ELECTRONIC DEVICES AND CIRCUITS LAB

Note: 1. All students may possess his own multimeter and soldering iron
2. Different value of components should be given for each batch of students

Study Experiments: (Not for Examination)
1. Identify and check the working condition of passive & active components and switches.
2. Identify the colour coding values of various resistors and capacitors
3. Identify the symbol of various electronic components.

List of experiments to be conducted using Hardware
1. Construct and plot the VI characteristics of PN junction diode
   a) Find the cut-in voltage of the diode
   b) Find the forward and reversedynamic resistance value of the diode from ' the characteristics
2. Construct and plot the VI characteristics of Zener diode and find the break down voltage.
3. Construct Halfwave and Center tapped Full wave rectifier with and without filters and find voltageregulation, ripple factor& efficiency.
4. Construct Bridge Full wave rectifier with and without filters and find voltageregulation, ripple factor& efficiency.
5. Construct and draw the Input and output characteristics of CE Transistor configuration and findits input & output resistance.
6. Construct and plot the drain characteristics of JFET and find its pinch off voltage.
7. Construct and plot the regulation characteristics of zener diode regulator. Calculate the percentage of regulation.
8. Construct and plot UJT characteristics and find its Ip and Vv.
9. Construct a positive and biased diode clipper and draw the output waveforms.
10. Construct and draw LED and LDR characteristics.

List of experiments to be conducted using Simulation:
11. Construct and draw the frequency response of RC coupled amplifier and determine the 3-dbbandwidth.
12. Construct and plot RC phase shift oscillator and find its frequency of oscillation by varying either R or C.
13. Construct and plot the frequency response of Common source amplifier and determine the gain and the input resistance of the amplifier.
14. Construct Astablemultivibrator using transistors and draw the output waveform and also find its frequency.
15. Construct diode clampers and draw the output waveforms

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 435**

Semester: **III**

Subject Title: **DIGITAL ELECTRONICS LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Digital Electronics Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Circuit Diagram &Pin diagram	40
2	Connection	15
3	Execution and Result	15
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	Digital IC Trainer Kits	----	8
2	Computers for Simulation Experiments	---	3
3	Software – LT Spice / Cedar logic / Multi Sim / Tina	----	(Any 1)

M435-DIGITAL ELECTRONICS LAB

Study Experiments: (Not for Examination)

1. Familiarization of logic gates using TTL and CMOS ICs.
2. Verification of truth table of OR, AND, NOT, NOR, NAND, EX-OR gates.

List of experiments to be conducted using Hardware

1. Realization of basic gates using NAND & NOR gates.
2. Verification of Demorgan's theorems
3. Half adder, Full adder using logic gates.
4. Half subtractor, full subtractor using logic gates.
5. Construction and verification of truth table for Decoder and Encoder.
6. Construction and verification of truth table Multiplexer and De-multiplexer
7. Parity generator and checker using discrete ICs.
8. Construction and verification of truth table for D, T and JK, flip-flops.
9. Construct and test the performance of a 4- bit asynchronous binaryripple counter
10. Construct a Single digit Decade Counter with 7 segment display.

List of experiments to be conducted using Simulation:

11. Realization of logic circuit for a given Boolean expression.
12. Construct and test shift register in SIPO and PISO modes.
13. Construct and test the performance of Mod N Counter and decade counter
14. Construct and test the performance of magnitude comparator
15. Construct and test the performance of a simple ALU circuit that consists of arithmetic, logical, comparator and shift operations

M SCHEME

(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 436**

Semester: **III**

Subject Title: **ELECTRICAL CIRCUITS AND INSTRUMENTATION LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Electrical Circuits And Instrumentation Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Circuit Diagram	35
2	Connection	10
3	Execution and Equipment handling	15
4	Result and Graph	10
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	DC Regulated power supply	0-30V, 1A	8
2	Signal Generator	1MHz	4
3	Dual trace CRO	20 MHz / 30MHz	5
4	Digital Multi meter	---	8
5	DC Voltmeter (Analog/Digital)	Different Ranges	8
6	DC Ammeter (Analog/Digital)	Different Ranges	8

7	Galvanometer and DRBs	Different Ranges	2
8	Computers for Simulation Experiments	----	3
9	Software – PSPICE / Multi Sim / LabView / Tina	----	(Any 1)

M436-ELECTRICAL CIRCUITS AND INSTRUMENTATION LAB

Note: 1. All students may possess his own multi meter and soldering iron

Study Experiments: (Not for Examination)

1. Conduct an experiment to study the functions of D.C motor, generator and transformer.
2. Use the multi meter to measure the voltage across the terminals, the current flowing in the circuit and the resistance of the load
3. Measure the amplitude and frequency of signals using dual trace CRO

List of experiments to be conducted using Hardware

1. Construct a circuit to verify ohm's law
2. Construct a circuit to verify kirchoff's voltage and current law
3. Construct a circuit to verify super position theorem
4. Construct a circuit to verify Thevenin's Theorem
5. Calibrate the given ammeter and voltmeter
6. Measure strain using strain gauge.
7. Construct and test the performance of Wheatstone bridge
8. Measure voltage and current using CRO
9. Test the performance of LVDT and load cell
10. Determine the characteristics of a thermistor

List of experiments to be conducted using Simulation:

11. Construct a circuit to verify Norton's Theorem
12. Construct a circuit to verify maximum power transfer Theorem
13. Construct and test the performance of series resonant circuit and parallel resonant circuit.
14. Construct and test the performance of a photo electric transducer
15. Extend the range of given voltmeter and ammeter

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 437**

Semester: **III**

Subject Title: **COMPUTER APPLICATIONS LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Computer Applications Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Section I	Section II
1	Procedure	10	10
2	Execution	20	20
3	Result	10	
4	Viva voce	05	
Total		75	

EQUIPMENTS REQUIRED:

S.No	Name of the Equipments	Required Nos.
1	Desktops and Laptops	6
2	Laser Printer	1
3	OS	Windows XP / Windows 7 / Windows 8 / Linux
4	Software	Microsoft Office 2007/2010 /2013 (or) Open Office

M437 -COMPUTER APPLICATIONS LAB

List of experiments to be conducted
1. WINDOWS

Introduction- History of Windows- screen saver and monitor resolution – Wallpaper setting-Folder manipulation – properties of a folder – Recycle bin – Short cuts – Sorting Folder –Switching between Application – Copying in CD/DVD settings – Recording Audio files.

Exercises

1) a. Installing screen saver and change the monitor resolution by 1280X960
   b. Setting wall papers
   c. Creating, moving, deleting and renaming a folder
   d. Copy, paste and cut a folder/file
   e. Displaying the properties for a file or folder

2) a. Restoring files and folders from Recycle bin
   b. Creating short cuts for folder/file
   c. Finding a file or folder by name
   d. Selecting and moving two or more files/folders using mouse
   e. Sorting folders/files.

3) a. Copying files into CD/DVD
   b. Switching between applications
   c. Making the taskbar wider and hiding the taskbar
   d. Recording and saving an audio file
   e. Set/Change the date and time.

2. WORD PROCESSING

Introduction to Word Processing – Examples- Creation of new documents, opening document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header footer deleting, moving, replace, editing text in document. Saving a document, spell checker. Printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height width of row or column. Editing, deleting Rows, columns in table. Borders, shading, Templates, wizards, drawing objects, mail merge.

Exercises

4) Creating a time table and perform the following operations on the table created
   a)Different alignments
   b)Applying borders and colors
   c) Changing the width of row and column
   d) merge and split different cells in the table
   e) Insert and delete rows and columns at various positions

5) Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations.

6) Create a news letter with following and perform the following tasks:

a) multiple columns text
b) differentformatting like font type, font size and font style etc.
c) applyingwatermark
d) header, footer and page number
e) applyingbullets and numbers.
f) inserting a clip art

3. SPREADSHEET

Introduction – Menus – Tool bar – Create – Edit – Save – Formatting cells – Chart wizard – FillColors – Creating and using formulas – Sorting – Filtering.

Exercises

7) Create a spread sheet and perform the following functions.
   a) Auto sum
   b) functions such as greater than, less than and equal to etc.
   c) Filter option
   d) auto fill option
8) Create a spread sheet and perform the given functions below
   a) Format with two decimal places
   b) Format with text and apply conditional formatting
   c) Freeze column
   d) Sort
9) Create a spread sheet and prepare the following charts
   a) line chart
   b) barchart
   c) pie chart

4. PRESENTATION

Introduction – Menus – Tool bar – Create – Edit – Save – Slide transition – Insert image – Hyperlink – Slide numbers – View slide show with sound – Photo album – Clip art.

Exercises

10) Make a presentation to implement different animation effects on pictures and clip art.
11) Create a Presentation with different slide transitions and sound effect.
12) Create a photo album in PowerPoint.

5. INTERNET PRACTICE

13. a) Search a given topic in web using different search engines (Google, Yahoo etc.)
b) Create a presentation on Google docs. Study about the review, comment and discussion options
14. Create a mail account using Gmail Service and study the following options
a) Compose, Draft, Inbox, Sent Items, Attach.
b)Make own signature and add it in mail
c) CC and BCC options

15.a) Study of Google Map and make a report on the places like Hotels, Hospitals and petrol bunks etc.

b) Create a blog in web

M SCHEME

(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 441**

Semester: **IV**

Subject Title: **COMMUNICATION ENGINEERING**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
CommunicationEngineering	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Networks, Antenna and Propagation	14
II	Amplitude Modulation	16
III	Angle and Pulse Modulation	15
IV	Audio systems	15
V	Video Systems	15
Revision and Test		15
Total		90

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 various types of networks, modulation, audio systems and video systems.

OBJECTIVES:

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

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

- 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 Transmitter & receiver
- Study the Frequency Modulation Process
- Learn about different types of FM Transmitters & Receivers
- Understand the concept Phase Modulation
- Understand the concept Pulse Modulation
- Learn Different types of Microphones
- Learn Different types of Loudspeakers
- Understand the different methods of Audio Recording & Reproduction
- Understand the principles of Monochrome &colour TV Related Topics

M 441 - COMMUNICATION ENGINEERING

Unit I: Networks, Antenna and Propagation

Networks (qualitative treatment only): Symmetrical and asymmetrical networks - characteristic impedance and propagation constant.

Equaliser: Types, constant resistance equalizer and applications of equalizers.

Attenuator: Types - symmetrical T and Pi attenuators – applications and simple problems

Filters: Types and definitions – circuit elements and cut off frequencies of LPF, HPF and BPF.

Antennas: Basic antenna principle - polarization, directive gain, directivity, radiation pattern - folded dipole - parasitic array - broad-side and end-fire array- Yagi antenna and parabolic antenna

Propagation: (short theory only) Ground wave propagation, sky wave, space wave propagation, ionospheric layers

Unit II: Amplitude Modulation

Modulation: Frequency spectrum. Relationship between wavelength and frequency, Need for modulation, types of modulation.

Amplitude modulation: Expression, AM spectrum and side bands, types of AM - balanced modulator - SSB generation – phase shift and filter methods, advantages and disadvantages of SSB. AM-VSB system - Diode detector.

AM Transmitter: Types of transmitters - high level AM transmitter and low level AM transmitter - SSB transmitter.

AM Receiver: TRF receiver, super heterodyne radio receiver- Selection of IF- Image frequency - AGC types - SSB receiver.

UNIT III: Angle and Pulse Modulation

Frequency modulation: Expression waveforms - frequency spectrum, effects of noise in FM, comparison of AM and FM, varactor diode modulator - FM detectors – slope detector, phase discriminator, ratio detector (qualitative treatment only)

FM Transmitters & Receiver: Direct and Indirect methods- stereophonic FM transmitter - FM receiver: Block diagram – AFC-stereophonic FM receiver.

Phase modulation: Principles, phase modulator circuit, comparison between FM and PM

Pulse modulation: Types, sampling theorem. Generation and detection of PAM, PWM, PPM, PCM, DPCM, Delta modulation– quantizing noise- companding.

Unit IV: Audio systems

Microphones: (Qualitative treatment only) Construction and performance of the following microphones: carbon, condenser, piezo-electric, moving coil and velocity ribbon.

Loud speakers: Constructional details of dynamic cone type, Horn type and electro-static loud speakers, woofer, midrange and tweeter, cross-over network. Surround-sound systems

Audio recording and reproduction: Compact disc system- MP3 system - DVD system - stereophonic system - Hi-Fi system principles- Dolby -DTS

Unit V: Video Systems

Monochrome Television: Scanning principles - synchronization - aspect ratio- composite video signal- TV broadcasting standards. TV transmitter- TV receiver.

ColourTV : Principles of colour transmission and reception- color CCD camera. PAL colour TV receiver (IC details not required) -

Video basics: Panel Displays – Principles of LED, LCD and TFT and Plasma Displays - resolution – interlacing - refresh rate – dot pitch – data projectors – touch screens - Principles of Handy cam, CCTV and cable TV.

Reference books

1. Networks lines and fields – John D.Ryder, PHI
2. Electronic communication Systems – Kennedy – TMH
3. Fundamentals of Acoustics – Kingsler&frey – Wiley Eastern ltd.
4. TV and Video engineering – ArvindM.Dhake – TMH.
5.Audio and Video system – Principles, maintenance and Troubleshooting by R.GuptaSecond Edition McGrawHill Education (P) Ltd.

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 442**

Semester: **IV**

Subject Title: **MICROPROCESSORS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Microprocessors	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Organization and Instruction set of 8085 Microprocessor	17
II	Timing Diagrams and data transfer schemes	14
III	Interrupts and memory interface	15
IV	Peripheral interfacingand Applications of 8085	15
V	Advanced Microprocessors and Bus standards	14
Revision and Test		15
Total		90

RATIONALE:
This course introduces microprocessor architecture and discusses the design of systems based on micro processors. The purpose of this subject is to cover the underlying concepts and techniques used in Micro Processor and Interfacing. It also briefs the students about interfacing of memory and I/O devices like A to D converter, D to A converter LED, LCD etc
The course will cover 8085 in detail with sufficient exposure to the industrial applications.

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

- To understand the history and need of Microprocessor.
- To understand the internal architecture details of 8085 Microprocessor.

- To know the instruction set of 8085
- To learn different timing diagrams of 8085
- To know different data transfer scheme of 8085 μP
- To understand Interrupt Structure of 8085
- To understand the interfacing techniques of memory and 8085 processor
- To study different peripherals such as 8255, 8257, 8259, 8251 and 8279 ICs and their functions
- To know different applications of 8085 μP
- To learn different type of advanced microprocessors

M442 - MICROPROCESSORS

Unit - I Organization and Instruction set of 8085 Microprocessor

Organization of microprocessor:

Block diagram and operation of a general Microprocessor system –Evolution Of Microprocessors –Features of 8085 Microprocessor – Bus structure of 8085 - Architecture – Pin details – Flag register – clock and reset circuit - Control and Status signals - demultiplexing of address and data bus.

Instruction set of 8085:

Instruction format – Addressing modes – Classification of instructions - data transfer, arithmetic, logical, branching, machine control – Stack and Subroutine

Unit - II Timing Diagrams and data transfer schemes

Timing diagrams:

Processor cycles – Definition of Processor cycles (T- State, Machine cycle, Execution cycle, Fetch cycle) – Timing Diagram for Opcode FETCH, Memory READ, memory WRITE, I/O READ, and I/O WRITE and $\overline{\text{INTA}}$- Timing diagram for MOV instruction and LDA only – Ready and Wait state (principle only)

Data transfer schemes in 8085:

Synchronous data transfer – asynchronous data transfer – Interrupt driven data transfer – DMA data transfer – three modes (single, block and demand transfer mode) - 8257 DMA controller – Block diagram and working principle

Unit III - Interrupts and memory interface

Interrupts of 8085:

Interrupt system of 8085 - Hardware and software interrupts in 8085 – Interrupt vector table of 8085 – Polling –hardware and Software polling –Programmable Interrupt controller IC 8259A – Block diagram – Signal diagram – Working principle.

Interfacing of memory:

Address space partitioning - Memory mapped I/O and I/O mapped I/O - Organization of RAM IC 6264 – Interfacing 8085 Microprocessor with IC 2764 and 6264

Unit IV- Peripheral interfacingand Applications of 8085(No programs needed)

PPI interface:

Interfacing with Programmable Peripheral Interface IC 8255 – Block diagram – Signal diagram – Control word format (I/O and BSR mode) - Working principle – Different Mode of operation (Mode 0, Mode1 and Mode2 - Concept only)

Other peripheral interfaces:
Interfacing with USART IC 8251 – Block diagram – Signal diagram – Working principle - Interfacing with Keyboard and display controller IC 8279 – Block diagram – Working principle

Applications of Microprocessors:
[No programs needed]Seven segment display interface –Stepper motor controller – Traffic light controller– waveform generation (sine wave, square wave and triangular wave)

Unit V - Advanced Microprocessors and Bus standards
Coprocessors: Basic principles of coprocessors -

CISC Processors:
Introduction to x86 processor – Architecture – BIU-IU-cache - FPU-MMU - The register set – Data format – Segmentation and Paging

Pentium Processor:
Features - Block diagram – Pipeline structure –Features of dual core processors.

Bus standards:
Need and types of bus standards- RS 232 serial Interface–I^2C- USB Bus standard

Reference Books:
1.MicroprocessorArchitechture Programming and Applications – Ramesh. S. Goankar., Wiley Eastern Ltd.
2.Microprocessor and Applications – R. Thiyagarajan.
3.Microprocessors – Principles and Applications., Charles. M. Gilmore., TMH
4.Advanced Microprocessors - Daniel Tabak., McGrawhill

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 443**

Semester: **IV**

Subject Title: **LINEAR INTEGRATED CIRCUITS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Linear Integrated Circuits	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Introduction To Operational Amplifiers	14
II	Op-Amp Applications	17
III	Voltage regulators and PLL	15
IV	Waveform generators and Special Function ICs	15
V	D/A and A/D Converters and their Applications	14
Revision and Test		15
Total		90

RATIONALE:

IC technology needs the fundamentals of Integrated Circuits for students regarding the application and special function ICs. The monolithic operational amplifier has become an important building block of linear integrated circuits and applications .This subject will impart in depth knowledge of operational amplifiers, their applications and also about various special function ICs like timer IC and regulator IC.

OBJECTIVES:

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

- To study basic Op-Amp and its characteristics

- To study the op-amp applications To know about PLL & its applications
- To learn about DAC and its types
- To understand the ADC concepts and its types
- To introduce special function IC – 555 timer
- To study about applications of IC 555
- To learn about fixed IC voltage regulators
- To discuss about general purpose regulator using IC
- To understand PLL & waveform generators.

M 443- LINEAR INTEGRATED CIRCUITS

Unit – I Introduction To Operational Amplifiers

IC fabrication: Classification of ICs – Advantages – fabrication process of Monolithic ICs – IC packages

Operational amplifier: Basic differential amplifier – working principle - Definition and symbol of Op- Amp – Block diagram of Op - Amp - Characteristics of an Ideal Op-Amp – Op - Amp parameters (CMRR and Slew rate) - IC 741 Pin details and specifications - virtual ground

Basic linear circuits: Inverting Amplifier, Non Inverting amplifier – sign changer – scale changer and Voltage follower

Unit – II Op-Amp Applications

Linear Applications of OP-AMP: Summing amplifier - Subracting Amplifier –Multiplier and divider - Comparator – Zero crossing detector - Integrator – Differentiator – Voltage to current converter – Current to voltage converter - V to F and F to V converters - Instrumentation Amplifier – pin detail and features of IC AD620 - Bar graph display - Pin detail and features of IC LM 3914

Non - Linear Applications of OP-AMP: Precision rectifier – Clipper – Clamper - LM 380 OP-Amp power amplifier - pin detail and features

Unit – III Voltage regulators and PLL (Qualitative treatment only)

IC voltage regulators: Linear fixed voltage regulator - Positive voltage regulator using IC 78xx, negative voltage regulator using IC 79xx –Variable voltage regulator using 317 and 337– General purpose regulator using LM 723- Low and High voltage regulator using LM 723

PLL: Basic principles of PLL – Block diagram and Working Principle – Lock range – capture range - Applications of PLL – frequency translation – frequency multiplication

Monolithic PLLs: IC 565 PLL - Pin diagram – Block diagram and working principle - IC 567 Tone decoder - DTMF generator IC 91215B and DTMF decoder ICMT 8870 - Pin diagram – Block diagram and working principle

Unit – IV Waveform generators and Special Function ICs: (qualitative treatment only)

Active Filters (First order only): Low pass – High pass – Band pass – Band stop – Circuit and Principle (qualitative treatment only).

Waveform generators: Square wave, triangular wave, sine wave, saw tooth - Function generator IC 8038 - block diagram and principle

IC 555 Timer: Pin diagram of IC 555 – Functional Block diagram of IC555 – Applications – Astablemultivibrator – monostablemultivibrator – Schmitt trigger

Unit – V D/A and A/D Converters and their Applications

DAC: Weighted resistor and – 2R ladder DAC

ADC: Dual slopeADCand Successive Approximation ADC - block diagram and working principle.

Monolithic ADC and DAC: ADC 0804 – DAC 1408 – Block diagram and working principle - Specifications of ADC / DAC (Accuracy, Resolution, Monotonocity, Settling time)

Sample and hold: Principle - circuit using LF 398A – Acquisition time – Aperture time.

Applications of ADC and DAC: DVM –Listing the types of DVM - Block diagram of DVM (Successive approximation type only) – Digital Frequency counter - Block diagram and principle of a PC Based data acquisition system

REFERENCE BOOKS:

1. Linear Integrated circuits – D.Roychoudhury&Shail .B. Jain – New age International Publishers – II Edition – 2004.
2. Operational Amplifiers and Linear Integrated circuits - Ramakant .A Gayakwad – Prentice Hall – 2000.
3. Linear Integrated Circuits by Salivahanan&V.S.Kanchana Baskaran-TMH-2008
4. Introduction to system design using IC -B.S. Sonde – Wiley Eastern Limited – II Edition – 1992

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 444**

Semester: **IV**

Subject Title: **PROGRAMMABLE LOGIC CONTROLLER**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Programmable Logic Controller	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Fundamentals of programmable Logic Controller	17
II	Basic fundamentals of PLC Programming	15
III	PLC wiring and ladder diagrams for field devices	14
IV	PLC Timer and counter programming	15
V	Process control and data acquisition system	14
Revision and Test		15
Total		90

RATIONALE:
Programmable Logic Controller is the mandatory for the control Engineers in any Process Industry. As it is the default controller being used in the industries in automation of process such as packing, discrete control etc., It is obvious for the instrumentation and control Engineer to understand Hardware and programming the PLC.

OBJECTIVES:

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

- To understand the detailed Hardware of PLC and its parts
- To understand the working of PLC and scan cycle
- T o understand the program and data memory organization
- To know the Different timers of PLC and programming them
- To know the different counters of PLC and its parameters
- To understand the Ladder logic programming of PLC
- To develop simple ladder programs
- To study the Advanced instructions of PLC
- To understand different process control systems of PLC
- To learn about the basic concepts of SCADA and CIM

M 444 PROGRAMMABLE LOGIC CONTROLLER

Unit - I Fundamentals of programmable Logic Controller:

Definition - Advantages - Parts of PLC - Principle of operation - comparison between PLC and computer - classification of PLC - memory size - applications.

I/O section - Discrete I/O modules - analog I/O modules - Special I/O modules - I/O specification - The CPU - programming devices - PLC work stations (Concept only)

Unit - II Basic fundamentals of PLC Programming

Logic fundamentals: AND, OR and NOT functions using switches - Boolean instructions and graphic symbols for various functions - Comparison of hardwired and programming logic

Definition of relay ladder logic and ladder logic diagram - relay schematic and ladder logic diagram for the following logic gates AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR. - relay schematic and ladder logic diagram for simple boolean equations (only two variables) - Programmable word level logic equations for AND, OR, NOT and EX-OR

processor memory map –address format - program scan - PLC-User communication - relay type instructions (EXAMINE IF OPEN, EXAMINE IF CLOSED, and OUTPUT ENERGIZE) - instruction addressing - branch instruction (input, output and nested)

Unit – III PLC wiring and ladder diagrams for field devices (Basic concepts only)

Electromagnetic relay control - contactors - motor starters – manually operated switches(Push button, selector and DIP switches) - mechanically operated switches – (Level and Pressure switches) Sensors – Proximity sensor, light sensor, ultrasonic sensor – Bar code sensor - Magnetic reed switch - output control devices (Solenoid and stepper motor)- latching relays (basic principle only)– converting relay schematic into PLC ladder programs (basic concept only) - example conveyor belt

Unit – IV PLC Timer and counter programming

programming timers - timer instructions – quantities associated with timer - coil formatted and block formatted timer instructions –on delay timer - off delay timer -

retentive timer - ladder logic and principle of operation - cascading timers (basic concepts only)

programming counters - counter instructions - up counter - down counter - cascading counter (basic concepts only) - combining counter and timer functions

Unit –V Process control and data acquisition system

Types of processes: continuous process, batch process - centralized and distributed control system (concept only)
Structure of control system: components of a process control system
Controllers: types of controller – Basic concepts of on-off, proportional, PID controllers

Supervisory Control and Data Acquisition (SCADA):Block diagram and operation.

Computer integrated manufacturing (CIM) - block diagram of different levels of CIM - Data communication - Network topology - master slave and peer to peer networks - I/O bus (device and process bus).

Reference Books:

1. Programmable Logic Controller - Frank D. Petruzella - TMH - third Edition
2. Introduction to Programmable Logic Controller -Gary Dunning - Thomson Delmar
3. Programmable Logic Controllers; Principles and applications
- Jhon W Webb Ronald A Rels - PHI
4. Exploring Programmable Logic Controllers with applications - Srivastava - BPB

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 445**

Semester: **IV**

Subject Title: **MICROPROCESSORS LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Microprocessors Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Program	35
2	Algorithm / Flowchart	10
3	Execution and Result	25
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	Microprocessor Trainer Kits	8085 μP	8
2	Add on Boards for interfacing experiments	---	Each 1
3	Software – Sim 8085 / GNU 8085 / Proteus	----	(Any 1)

M445 – MICROPROCESSORS LAB

Study Experiments: (Not for Examination)
1.Study the microprocessor 8085 kit and identify the various functions of each key.

List of experiments to be conducted using Microprocessor Kit (Hardware)

1. 8 bit addition using different addressing modes (direct, register, register indirect and immediate)
2. Multi-byte addition
3. 8 bit subtraction, multiplication and division
4. Finding the smallest and largest value in an array
5. Arranging the given data in ascending order and descending order.

6Code conversions:

   a) BCD to Hexa conversion and vice versa
   b) Binary to Grey and vice versa

7. To fill a given data in 50 Locations in memory.
8. Program to convert Hexa to ASCII conversion and vice versa using look up table
9. Odd and even parity generators

Interfacing experiments:

10. I/O operations using switches and LEDswith 8085 through 8255
11. Interfacing of seven segment display
12. Generating waveforms (square, sine and triangular)
13. Stepper motor control
14. Traffic light controller

List of experiments to be conducted using Simulator (Software):

15. Sum of datain a given array
16. BCD addition and subtraction.
17. Generate the fibonacci series
18. Block transfer of data with and without overlapping

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 446**

Semester: **IV**

Subject Title: **LINEAR INTEGRATED CIRCUITS LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Linear Integrated Circuits Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Circuit Diagram	35
2	Connection & Execution	25
3	Result and Graph	10
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	Software – LT Spice / Multi Sim /Tina / ORCAD	----	(Any 1)

M446 - LINEAR INTEGRATED CIRCUITS LAB

Note: 1. All students may possess his own multimeter and soldering iron

List of experiments to be conducted using Hardware

1. Inverting Amplifier and Non inverting amplifier using OP-AM
2. Summing amplifier and Differential amplifier using OP-AMP
3. Voltage comparator using OP-AMP
4.. Integrator using OP-AMP
5.Astablemultivibrator and using IC 555
6. Fixed Voltage regulators using IC 7805, and IC 7912
7. Variable Voltage regulators using IC 317 and 337
8. General purpose Voltage regulator using IC 723
9. D/A converter using DAC 1408 IC.
10. Construct a bar graph display using IC 3914

List of experiments to be conducted using Simulation:

11. Construction and testing of Instrumentation Amplifier
12. Construction and testing of AC high gain amplifier
13. Construct and test a Schmitt trigger circuit using IC 555.
14. Construct and test R/2R ladder DAC.
15. A/D converter using ADC 0809

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 447**

Semester: **IV**

Subject Title: **LIFE AND EMPLOYABILITY SKILLS LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Life And Employability Skills Lab	4	60	25	75	100	3 Hrs

Allocation of marks

Sl. No.	Section	No. of Hours
1	**Part – A** Communication	**30**
2	**Part – B** Entrepreneurship, Project Preparation Productivity, Occupational Safety, Health, Hazard, Quality Tools & Labour Welfare	**20**
3	**Part – C** Environment, Global Warming, Pollution	**10**
TOTAL		**60**

RATIONALE:

Against the backdrop of the needs of the Industries, as wells as based on fulfilling the expectations of the Industries, the Diploma Level students have to be trained directly and indirectly in toning up their competency levels. Proficiency in Communication only, equips them with confidence and capacity to cope with the employment. Hence, there is a necessity to focus on these in the curriculum. At the end of the Course, the student is better equipped to express himself in oral and written communication effectively.

SPECIFIC INSTRUCTIONAL OBJECTIVES

- **Emphasize and Enhance Speaking Skills**
- **Increase Ability to Express Views & Opinions**
- **Develop and Enhance Employability Skills**
- **Induce Entrepreneurship and Plan for the Future**
- **Expose & Induce Life Skills for Effective Managerial Ability**

M447 - LIFE AND EMPLOYABILITY SKILLS LAB

Unit	Topics	Activities	Hours
I	**Communication, Listening, Training, Facing Interviews, Behavioural Skills**	-- instant sentence making -- say expressions/phrases -- self- introduction / another higher official in company	**30**
II	**Entrepreneurship, Project Preparation, Marketing Analysis, Support & Procurement**	-- prepare an outline of aproject to obtain loan frombank in becoming anentrepreneur -- prepare a resume	**10**
III	**Productivity – comparison with developed countries, Quality Tools, Circles, Consciousness, Management, House Keeping**	-- search in the website -- prepare a presentation -- discuss & interact	**05**
IV	**Occupational Safety, Health Hazard, Accident & Safety, First-Aid, Labour Welfare Legislation, Welfare Acts**	-- search in the website -- prepare a presentation -- discuss & interact	**05**
V	**Environment, Global Warming, Pollution**	-- taking down notes / hints -- answering questions -- fill in blanks the exactwords heard	**10**

LEARNING STRUCTURE **100 Marks**

-- **Focus more on Speaking & Listening Skills**
-- **Attention less on Reading & Writing Skills**
-- **Apply the skills in fulfilling the Objectives on Focused Topics**
--

a) Listening **25 Marks**

1. Deductive Reasoning Skills (taking down notes/hints) **10**
2. Cognitive Skills (answering questions) **10**
3. Retention Skills (filling in blanks with exact words heard) **05**

b) Speaking Extempore/ Prepared **30 Marks**

1. Personality/Psychological Skills (instant sentence making) **05**
2. Pleasing & Amiable Skills (say in phrases/expressions) **05**

3. Assertive Skills (introducing oneself/others) **05**
4. Expressive Skills (describe/explain things) **05**
5. Fluency/Compatibility Skills (dialogue) **05**
6. Leadership/Team Spirit Skills (group discussion) **05**

c) Writing & Reading **20 Marks**

1. Creative & Reasoning Skills (frame questions on patterns) **05**
2. Creative & Composing Skills (make sentences on patterns) **05**
3. Attitude & Aim Skills (prepare resume) **05**
4. Entrepreneurship Skills (prepare outline of a project) **05**

d) Continuous Assessment (Internal Marks) **25 Marks**

(search, read, write down, speak, listen, interact & discuss)

1. Cognitive Skills (Google search on focused topics)
2. Presentation Skills & Interactive Skills (after listening, discuss)

Note down and present in the Record Note on any 5 topics **10 Marks**
Other activities recorded in the Record note **10 Marks**
Attendance **05 Marks**

INTERNAL MARKS **25 Marks**

EXTERNAL MARKS AT END EXAMINATION **75 Marks**

MODEL QUESTION

Time: 3 Hours **Max.Marks: 75**

A. LISTENING **25Marks**

1.Listen to the content and take down notes/hints 10
2.Listen to the content and answer the following questions. 10
3.Listen to the content and fill in the blanks the exact words heard. 05

B. SPEAKING **30 Marks**

1.Say in a sentence instantly on hearing the word (5 words, one after another). 05
2. Say any five expressions commonly used in communication. 05
3. Imagine, a consultant has come to your department.Introduce him to your subordinates. 05
4.Explain/describe the product you are about to launch in the market. 05
5. Speak with your immediate boss about the progress you have made. 05
6.Discuss within the group on the topic of focus in the syllabus. 05

C. WRITING & READING **20 Marks**

1. Frame new questions from the pattern given by changing sets of words with your own. 05

a.	When	Do	you	return?
b.	How	Is	his performance?	
c.	Where	Has	the manager	gone?

d.	What	Is	the progress	today?
e.	Why	Are	the machines	not functioning?

2. Make sentences from the pattern given by changing sets of words with your own.05

a.	The workers	are	on strike		
b.	The labourers	are paid	well	in this factory	
c.	There	is	a rest room	for the workers	
d.	These	are	the new products	launched	by our company
e.	Almost everyone	come	to the company	on motorbikes	

3. Prepare a resume for the post of Department Manager. 05

4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings) 05

Guidelines for setting the question paper

A. LISTENING:

ONLY TOPICS related to POLLUTION /ENVIRONMENT /GLOBAL WARMING are to be taken.These topics are common for all the three types of evaluation.

B. SPEAKING:

- ✓ WORDS of common usage
- ✓ Fragments – expression of politeness, courtesy, cordiality
- ✓ Introduce yourself as an engineer with designation or Introduce the official visiting your company/department
- ✓ Describe/Explain the product/machine/department
- ✓ Dialogue must be with someone in the place of work.
- ✓ Group of six/eight
- ✓ Discuss the focused topic prescribed in syllabus

C. WRITING & READING:

- Provide five different structures.
- Students are to substitute at least one with some otherword/words
- Provide five different structures.
- Students are to substitute at least one with some other word/words
- Provide some post related to industries.
- Outline of the project (skeleton/structure)
- Only the various headings and subheadings
- Content is not needed

Guidelines for recording the material on the Focused Topics in the Record note.

Write in the record note, **on any five topics**, from the list of topics given below. **10 Marks**
(5 topics x 10 marks = 50 marks. Thus, the **Average of 5 topics is 10 Marks)**

1. Productivity in Industries – Comparison with developed countries
2. Quality Tools, Quality Circles and Quality Consciousness
3. Effective Management
4. House Keeping in Industries
5. Occupational Safety and Hazard
6. Occupational Accident and First Aid
7. Labour Welfare Legislations
8. Labour Welfare Acts and Rights
9. Entrepreneurship
10. Marketing Analysis, Support and Procurement

LABORATORY REQUIREMENT:

1. An echo-free room
2. Necessary furniture and comfortable chairs
3. A minimum of two Computers with internet access
4. A minimum of two different English dailies
5. A minimum of Three Mikes with and without cords
6. Colour Television (minimum size – 29")
7. DVD/VCD Player with Home Theatre speakers
8. Smart board
9. Projector

Suggested Reading:

1. Production and Operations Management by S.N. Chary, TMH
2. Essentials of Management by Koontz &Weihrich, TMH
3. Modern Production / Operations Management by E.S. Buffa and R.K. Sarin, John Wiley & Sons
4. Production Systems: Planning, Analysis and Control by J.L.Riggs, 3rd ed., Wiley.
5. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, Macmillan
6. Operations Research - An Introduction by H.A.Taha, Prentice Hall of India
7. Operations Research by J.K.Sharma, Macmillan
8. Business Correspondence & Report Writing by R.C. Sharma and K.Mohan, TMH
9. How to prepare for Group Discussion & Interview (With Audio Cassette) by Prasad, TMH
10. Spoken English – A self-learning guide to conversation practice (with Cassette)
11. Introduction to Environmental Engineering by Mackenzie, L. Davis and A. David, Cornwell, McgrawHill, 3rd Ed.
12. Environmental Engineering by Peary, Rowe and Tchobanoglous, McgrawHill
13. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
14. Quality Control and Applications by Housen&Ghose

15. Industrial Engineering Management by O.P. Khanna

M SCHEME

(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 451**

Semester: **V**

Subject Title: **ADVANCED COMMUNICATION SYSTEM**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Advanced Communication System	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Telephone, FAX and Mobile Communication	15
II	Radar And Navigational Aids	15
III	Digital communication	15
IV	Optical communication	15
V	Satellite Communication	15
Revision and Test		15
Total		90

RATIONALE:

The introduction of this subject will enable the students to learn about the advancement in communication systems. It will give exposure to the various modes of communication viz Radar, Telephone, Fax, digital communication, digital codes, fiber optical communication, satellite communication, microwave communication, mobile communication and Satellite multiple access techniques.

OBJECTIVES:

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

- To understand principles of Radar.
- To understand principles of navigation aids
- To study different microwave devices
- To learn about the basic concepts of microwave communication system
- To study electronics exchange and principles of facsimile communication.
- To study basic digital communication system and digital codes.
- To learn error detection and correction codes.
- To learn various digital modulation techniques.
- To understand optical communication system and discuss about fiber nodes, configurations and losses.
- To learn optical sources, optical detectors.
- To study satellite system, orbits, antennas
- To understand fundamentals of microwave communication
- To study fundamental cellular concepts such as frequency reuse, hand off
- To learn multiple access techniques.
- To learn digital cellular systems – GSM.

M451 ADVANCED COMMUNICATION SYSTEM

Unit - I Telephone, FAX and Mobile Communication

Telephony:

Telephone system –Pulse and Tone dialling - Public switched Telephone network (PSTN) – Private Telephone Network - Electronic Switching System - Block diagram - Video phone – Block diagram – ISDN – Architecture - Features.

FAX:

Facsimile sender- Cylindrical scanning– Facsimile receiver - synchronization – phasing - Index of cooperation (IOC) - Direct recording and photo graphic recording.

Mobile communication (Qualitative Treatment only):

Cellular telephone - fundamental concepts – Simplified Cellular telephone system - frequency reuse – Interference – Co – Channel Interference – Adjacent Channel Interference – Improving coverage and capacity in cellular systems - cell splitting – sectoring - Roaming and Handoff – Basics of blue tooth technology.

Unit - II Radar And Navigational Aids

RADAR:

Basic Radar System– Applications – Radar range equation (qualitative treatment only) – factors influencing maximum range – Basic PulsedRadar System – Block Diagram – Display Methods A - Scope, PPI Display - Automatic target detection.

Radio aids to navigation:

Direction finding – Radio compass - Instrument landing system – Ground controlled approach system.

Microwave communication:
Microwave frequency ranges –microwave devices -Parametric amplifiers –Travelling wave tubes –simple block diagram of microwave transmitter, receiver and microwave link repeater.

Unit III - Digital communication

Digital Communication Fundamentals:
Fundamental block diagram and basic elements of digital communicationSystem-characteristics of data transmission circuits-Bandwidth requirement – speed-Baud rate – Noise – crosstalk – Distortion.

Digital codes:
ASCII,EBCDIC and Baudotcodes – Error detection codes – Parity check codes –
Redundant codes – Constant ratio codes - Error correction codes – Retransmission, forward error correcting code – Hamming code.

Digital modulation techniques:
ASK, FSK, PSK, QPSK modulation/demodulation techniques (only block diagram and operation).

Unit IV - Optical communication

Optical communication system - Block diagram –advantages of optical fiber Communication systems – principles of light transmission in a fiber using Ray Theory – Single mode fibers, multimode fibers – step index fibers, graded index fibers (basic concepts only) – Attenuation in optical fibers – Absorption losses, scattering losses, bending losses, core and cladding losses.

Optical sources:
LED - semiconductor LASER – Principles – optical detectors – PIN and APD diodes - Connectors - Splices – Couplers – optical transmitter – Block diagram – optical receiver - Block diagram - Application of optical fibers – Networking, Industry and Military applications.

Unit V- Satellite Communication

Satellite system: Kepler's I,II,III laws – orbits – types- Geostationary synchronous satellites- Advantages -LEO, MEO – Apogee - Perigee- Active and passive satellite— Earth eclipse of satellite - Launching orbits.

Antenna: Parabolic reflector antenna –Cassegrain antenna, Horn – Lens antenna.

Space segment:Power supply- Attitude control- station keeping – Transponders – TT and C subsystem – Thermal control – Antenna subsystem.
Earth segment–Block diagram of Transmit receive earth station – Satellite mobile services – Basics of GPS.

Satellite services: INTELSAT, METSAT,Basics of GPRS.

Reference Books

1. Electronic communication systems - Kennedy - Davis - fourth Edition - Tata McGraw Hill - 1999.
2. Optical fiber communication - Gerd Keiser - Third Edition - McGraw Hill - 2000
3. Satellite communication - Dr. D.C. Agarwal - Third Edition - Khanna publishers - 1995
4. Electronic Communications systems - Fundamentals through Advanced - Wayne Tomasi - Fifth Edition - Pearson Education – 2005

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 452**

Semester: **V**

Subject Title: **MICROCONTROLLERS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Microcontrollers	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Organization of 8051 Microcontroller	15
II	Instruction Set And Programming	17
III	Timer, Interrupt and Serial Programming	17
IV	8051 advanced programming concepts:	12
V	Interfacing of 8051	14
Revision and Test		15
Total		90

RATIONALE:
Microcontroller is the sole of all embedded electronic equipments and is used in most of the areas of electronics. They include product ranges from tiny consumer electronic products to complex industrial process controllers. A diploma engineer needs to maintain such systems. Programming practices will further help the students to develop indigenous microcontroller based applications.

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

- Explain Architecture of 8051 Microcontroller.
- Explain the functions of various registers.
- Study the various instructions of 8051
- Understand interrupt structure of 8051.
- Understand serial data communication concepts.
- Understand the programming techniques.
- Explain various addressing modes.
- Write programs for different types of timers and counters
- Write Embedded C programs using 8051
- Understand how to interface with RS232C.
- Understand various application of 8051 Microcontroller

M452– Microcontrollers

Unit –I Organization of 8051 Microcontroller

Architecture of 8051:

Block diagram of a general microcontroller – Comparison with Microprocessor andMicrocontroller – Overview of 8051 family – Architecture of 8051 –ALU – Pin details of 8051 – Clock & Reset circuit–Program Counter – PSW register – register banks – Bank 1 and Stack conflict –I/O Ports– Bit addresses for I/O and RAM

Memory structure of 8051: **[7]**

Internal memory (ROM and RAM)– Special Function Registers –Memory Map of internal RAM (including registers and register banks) – Bit address for RAM - Code and data memory

Unit II Instruction Set And Programming

Assembling and running an 8051 program – Instruction set of 8051 –Addressing modes of 8051 – Data transfer instructions –Arithmetic Instructions – Logic and Compare instructions – Rotate and swap instructions– DA A–Bit manipulation instructions – Data serialization –Branching instructions: Loop and jump instructions –Call instructions – Time delay routines– 8051 I/O programming – I/O bit manipulation programming – Assembler directives

Unit – III Timer, Interrupt and Serial Programming

Timer registers (Timer 0 and timer 1) – Significance of TMOD and TCON registers – Different modes of Timer – Timer programming in Mode 1 and mode 2 –Counter programming in mode 1 and mode 2.

8051 Serial Port Programming

Principles of asynchronous serial communication - Interfacing of RS 232 with 8051 – Importance of MAX 232 - Baud rate in 8051 - Significance of SCON and SBUF register - Programming the 8051 to transmit data serially - Programming the 8051 to receive data serially - Importance of PCON register

8051 interrupt programming:

Interrupts and their vector table of 8051 – IP and IE registers – Programming Timer Interrupts –Programming external hardware interrupts – Programming the serial communication interrupt– Interrupt priorities of 8051

Unit IV 8051 advanced programming concepts:

C data types for 8051 – I/O programming in 8051 C (Byte addressable I/O – Bit addressable I/O – SFR I/O) – logic operations in 8051 C – Data conversion programs in 8051 C (Packed BCD to ASCII conversion, ASCII to Packed BCD conversion and vice versa, Binary to decimal, simple time delay) – Data serialization in 8051 C

Unit – V Interfacing of 8051

Interfacing of external ROM with 8051 chip – Interfacing the LCD– Interfacing hex–keyboard and 8051 –DAC and ADC interfacing – sensor interfacing and signal conditioning– DS 12887 RTC interfacing –DC motor interfacing.

REFERENCE BOOKS:

1. 8051 Microcontroller and Embedded Systems using Assembly and C by Mazidi, Mazidi and D.MacKinlay, 2006 Pearson Education Low Price Edition.
2. Microcontrollers, Principles and Applications – Ajit pal – PHI Ltd., - 2011.
3. Microprocessor and Microcontroller by R.Theagarajan, Sci Tech Publication, Chennai
4. 8051 Microcontroller by Kenneth J.Ayala.

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 453**

Semester: **V**

Subject Title: **VLSI PRINCIPLES**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
VLSI Principles	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Basic Concepts of VHDL	16
II	Concurrent and Sequential codes	15
III	State machines and Packages	15
IV	Components, Functions and Procedures	14
V	Introduction to CPLD and FPGA	15
Revision and Test		15
Total		90

RATIONALE:

Very Large Scale integration technology, when especially used for digital integrated circuit design is that it is mandatory the behaviour of the required system to be described (modelled) and verified(simulated) before synthesis tools translate the design into real hardware fabrication in the foundry(gates and wires). Hardware Description Language (HDL) allows designs to be described using any methodology - top down, bottom up or middle out. VHDL can be used to describe hardware at the gate level or in a more abstract way. This course is to introduce the digital system design concepts through HDL, VHDL programming, design flow of VLSI, and architectures of CPLD and

FPGA. It is mainly aimed at design of combinational and sequential functions at gate / behavioral level and simulates and verifies their functionality using the VHDL.

OBJECTIVES:

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

- Understand device level implementation of digital gates.
- Design a combinational circuit for any custom made application
- Explain the building blocks for the combinational circuit
- Develop a VHDL code for any combinational circuit
- Answer the VHDL primitives and the importance of VHDL code in a digital circuit
- Know the concurrent and sequential statements used for VHDL programming
- Explain the style of Moore and Mealy type machines
- Understand the basic concepts of packages, functions and procedures
- Learn how to write the VHDL codes using component
- Explain the importance of PROM, PLA, PAL and PLD
- Differentiate between the PROM,PLA and PAL.
- Understand the CPLD and FPGA hardware.
- Describe ASICs

M - 453 VLSI PRINCIPLES

Unit - I Basic Concepts of VHDL

VHDL - Design flow - List of EDA tools available – Fundamentals VHDL units – List of VHDL libraries - Library declaration - Entity - Architecture

Objects - Constants - Signals - Variables –Comparison of signal and variable - File - Data types - pre defined and user defined - sub types (enumerated) - arrays - records - Type conversion.

Operators - Assignment, logical, relational, arithmetic, shift, concatenation - data and signal attributes - operator overloading - generic – Generic parity generator and parity detector

Unit - II Concurrent and Sequential codes

Concurrent code using operator - WHEN statement (WHEN ELSE - WITH SELECT) - 4 to 1 Multiplexor using the above statements

GENERATE statement - BLOCK statement - Simple and gaurded block –Guarded block using D Latch

PROCESS statement - IF statement - WAIT statement - WAIT UNTIL, WAIT ON, WAIT FOR - CASE statement - Comparison between WHEN and CASE – One digit decade counter using IF,WAIT and CASE.

Loop (While and For), NEXT, EXIT and NULL statements - Barrel shifter using FORstatement– Comparison of concurrent versus sequential codes

Unit - III State machines and Packages **[13]**

Sequential Circuit Design - State diagram, State table, State assignment - FSM encoding styles (Basic concept only - Sequential Binary encoding, One hot encoding and Gray encoding) - Syntax for Moore type FSM – BCD counter using Moore model - Syntax for Mealy type FSM –Signal generator using Mealy model – Comparison between Moore and Mealy

Packages –syntax and principle (concept only) – package with function (concept only)

Unit - IV Components, Functions and Procedures

Component - Declaration, instantiation - declaration in the main code - declaration inside the package - Port MAP and Generic MAP – Carry Ripple Adder using component

Functions and Procedures:

Function declaration and function call - Function location –Simple function for Shift Integer.

Procedure - Procedure declaration and Procedure call - Procedure location - Simple procedure for maximum of two numbers - Comparison between function and procedure – ASSERT statement

Unit - V Introduction to CPLD and FPGA (Concepts only) **[14]**

Introduction to ASIC – Types of ASIC - Full custom, semi-custom, Programmable and gate array – (basic concepts only) – Comparison between types – applications of ASIC

Introduction to CMOS devices: **[5]**

Transistor switches (PMOS and NMOS) - NMOS logic gates (NAND, NOR and NOT gates) - CMOS logic gates - (NAND, NOR and NOT gates) - Negative logic system -

Programmable Logic Devices: **[9]**

PALs - PLAs - General Structure of FPGA and CPLD - two input look up table using FPGA for AND,OR and XOR – Applications of CPLD and FPGA

Reference Books :

1. Circuit design with VHDL - Volnei A. Pedroni- MIT Press
2. Fundamentals of Digital Logic with VHDL design" Stephen brown and Vranesic 2nd edition McGrawHill,2008
3. VHDL - A design oriented approach - S SLimaye 3rd Edition - TMH
4. VHDL Primer -Bhasker J Prentice Hall India -2009

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 4541**

Semester: V

Subject Title: **BIO MEDICAL INSTRUMENTATION**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Bio Medical Instrumentation	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Bio Potential Electrodes And Recorders	15
II	Therapeutic Instruments	15
III	Clinical Instruments	15
IV	Modern Imaging Techniques	15
V	Telemedicine and Patient Safety	15
Revision and Test		15
Total		90

RATIONALE:

Bio medical engineering education is in the growing stage. But every year, there is a tremendous increase in the use of modern medical equipment in the hospital and health care industry therefore it is necessary for every student to understand the functioning of various medical equipments. This subject to enable the students to learn the basic principles of different biomedical instruments viz Clinical measurement, Bio - medical recorders, Therapeutic instruments, Biotelemetry and Modern imaging techniques instruments.

OBJECTIVES:

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

- The generation of Bio-potential and its measurement using various electrodes.
- The measurement of blood pressure and lung volume.
- The measurement of respiration rate.
- The measurement of body temperature and skin temperature.
- The principles of operations of ECG,EEG and EMG recorder.
- The working principles of audio meter.
- The principles of operations of pacemaker.
- The basic principle of dialysis.
- The basic principle of short wave diathermy.
- The basic principle of ventilators.
- The basic principle of telemetry and telemedicine.
- The various methods of accident prevention and patient safety
- The basic principle of various types of lasers.

M4541 - BIO MEDICAL INSTRUMENTATION

Unit - I Bio Potential Electrodes And Recorders

Bio Potentials:

Resting and action potential – Bio Electric Potential –Components of Bio Medical Instrument System

Electrodes:

Electrode potential –Types of electrodes – Micro – Surface – Depth and Needle electrodes

Bio Potential Recorders:

Electrocardiograph (ECG) – ECG Lead configuration – ECG recording set up – Specifications of ECG recorder – clinical uses of ECG – Phonocardiography (principle and applications only) - Electroencephalography (EEG) – Origin of EEG – Brain waves – 10-20 lead system – recording Set up – Clinical uses of EEG

Unit –II Therapeutic Instruments

Cardiac pacemaker:

Types - Comparison between External pace makers and implantablepacemaker – Operation of synchronous and asynchronous pacemakers

Defibrillators:

Types – AC – DC defibrillators

Nerve and muscle stimulators:

Definition of Electrotherapy – Waveforms used in stimulators – Working principle of Versatile Electro Diagnostic Stimulator

Kidney machine:

Dialysis – Hemo dialysis – Peritoneal dialysis - Comparison between hemo and peritoneal dialysis.

Unit – III Clinical Instruments

Operation theatre measurements:

Principle – working of Automatic Bekesy audiometer - Surgical Diathermy – Waveforms used in surgical diathermy – Block diagram – operation – Ventilator – block diagram and description

Specialized medical instruments:

Measurement of Blood pressure – Working principle and applications of Electromagnetic blood flow meter – blood pH – digital pH meter - Blood Cell counter – diagram and principle

Electron microscope:

Construction and working principle – Comparison between optical microscope and electron microscope.

Unit - IV Modern Imaging Techniques

X ray, CT scan and laser beam:

X ray apparatus – block diagram – Working Principle – Comparison between Radiography and Fluoroscopy –Angiography(Concept only) - Clinical uses of X- Ray Examination - Computer Tomography - Block diagram and operation – Applications.

LASER in medical electronics:

LASER beam properties and principle of operation – Applications of LASER in medicine.

Advance medical instruments:

Concepts and applications of Endoscope - Magnetic Resonance Imaging - Ultra sonic imaging - Bio feedback instrumentation – Block diagram and principle.

Unit – V Telemedicine and Patient Safety

Introduction to telemetry:

Elements of Bio Telemetry system –Radio Telemetry system – Block diagram and working principle – Limitations and Applications.

Safety Instrumentation:

Radiation safety instrumentation – effect of radiation exposure – Radiation monitoring instruments – Pocket dosimeters and film dosimeters –Physiological effects due to 50Hz current passage

Micro and macro shock – Electrical Accidents in hospitals – microshock and macro shock hazards – Devices to protect against electrical hazards - Ground fault circuit interrupter – Isolation transformer and line isolation monitor (concepts only) - Hospital Architecture

Telemedicine:

Introduction to Telemedicine:Telemedicine – Introduction – working – applications

Reference Books:

1. Dr. M. Arumugam – Bio Medical Instrumentation ,Anuradha agencies, Publishers

2. Leslie Crom well – Fred.J. Weibell, Erich A.P Feither – Biomedica Instrumentation and measurement, II edition.
3. B.R. Klin – Introduction to Medical Electronics.
4. Kumara doss – Medical Electronics.
5. R. S. Khandpur – Handbook of Bio – Medical Instrumentation.

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 4542**

Semester: **V**

Subject Title: **ELECTRONIC SYSTEM DESIGN**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Electronic System Design	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Design of Power supply	15
II	Design of small signal amplifiers	16
III	Data acquisition system	14
IV	Design of function generators	15
V	High voltage/high current driver	15
Revision and Test		5
Total		90

RATIONALE:
The rationale behind introducing this subject is to make the students understand the structure, working and all other relevant aspects of electronic systems which has become an integral part of Electronic media which is growing at an exponentially high rate all around the world.

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

- To understand to design of DC regulated power supply of various voltages with different protection circuits.
- To understand the design of different types of amplifiers for various application.
- To understand the use of various transducers and make use them.
- To design various systems using the analog data collected from transducers
- To understand the use of microcontrollers for various application

M – 4542ELECTRONIC SYSTEM DESIGN

UNIT I - Design of Power supply:

DC power supply with filters, regulators & protection circuits, Multi output and variable power supply design.

UNIT II - Design of small signal amplifiers:

Emitter follower, Darlington pair amplifiers with and without Bootstrapping, Two stage direct coupled amplifiers. Design of audio power amplifier with drivers, Design of simple PA system

Voltage to current converter, current to voltage converter.

UNIT III - Data acquisition system:

ADC, DAC, Design of Instrumentation amplifier with the bridge type transducer, Temperature measurement, Design of Electronic voltmeter and ammeter, Display system.

UNIT IV - Design of function generators:

Design of AM signal using multiplier IC, AM signal demodulation using envelope detector, Design of FM signal using VCO (using IC NE566).

UNIT V - High voltage/high current driver:

Circuit for Relay and motor control applications. Microcontroller based closed loop system, security systems, scrolling display; Microcontroller based stepper motor control system.

REFERENCE BOOKS:

1. N.C.Goyel, R.K.Khetan, A Monograph on Electronic s Design Principles, Khanna Publishers
2. DC Power Supply Handbook, Agilent Technologies
3. The art of electronics by Paul Horowitz, Cambridge University Press

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 4543**

Semester: **V**

Subject Title: **ROBOTICS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Robotics	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Basic Concepts of Robotics	15
II	Robot Hands	16
III	Robot brain and muscles	14
IV	Robot vision	15
V	Applications of Robot	15
Revision and Test		5
Total		90

RATIONALE:
Robotics is the science or study of the technology associated with the design, fabrication, theory, and application of robots. This course begins by introducing the subject of robotics, presents a brief history, types, classification and usage, and the science and technology of robots. Representation of joints, different kinds of actuators, sensors are presented in this subject. Robot grippers and manipulators are discussed in depth. Several applications in the field of Industrial and component handling, material handling, and manufacturing are discussed in details.

OBJECTIVES:

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

- The basics of robot
- Anatomy and working of Robot
- End effectors and robot controls
- Manipulators and grippers
- Robot Transformations and Sensors
- Robot drive mechanism
- Safety consideration of Robot
- Applications of Robot in various fields
- Basic concept of SWARM Robot

M– 4543 Robotics

Unit - I Basic Concepts of Robotics

Introduction to robots: Definition –Characteristics of a robot – Diffference between Human and the robot – Basic fundamentals of a robot (axis, Cartesian coordinates, rotate, translate, degree of freedom, home position, link and joints) – methods of positioning - Generations of robot – Benefits and shortcomings

Anatomy of a robot – working principle of robot – Classification of robot - Motion control - Point to point and continuous path robot (principle only) – specifications for a robot- Components of a robot system

Unit – II Robot Hands:

End effectors: need for end effector – Types of end effector – Robot gripper – classification for grippers – criteria for selecting grippers –mechanical and magnetic grippers (basic principle only) - various gripping techniques

Manipulator – Definition – function of a manipulator – requirements of interpolators – Hierarchical structure of a robot system –work place lay out of a robot

Unit III – Robot brain and muscles:

Robot controller – Definition - functions of a controller – structure of a robot controller - Control system - open loop and closed loop control system – feedback control system- applications of control system –
Robot drive mechanisms: Linear, rotary and harmonic drive mechanisms
Power systems for robot – Hydraulic, pneumatic, and electric power systems (DC motor, AC motor, servo motor and stepper motor) – diagram and working principle

Unit IV: Robot vision

List of sensors used in robot – Proximity and reed switches – Range and tactile sensors – Vision sensor – Light sensor – speed and sound sensors – displacement sensor – Heat sensors

Robot Safety consideration – Need for safety – Safety guidelines and checklists – Safety hazards

Unit V: Applications of Robot

Robot programming languages and operating systems (basic concepts only)

Applications of Robots: List of applications for the following category: Industrial and Component handling

Material handling applications (pick and place, palletizing and packaging – basic principle only) – Applications in the field of Manufacturing – Robots in the field of assembling and welding.

Introduction to SWARM robots (principle only) –Perspectives of Future robots

REFERENCE BOOKS

1. Robotics – Principels and practice – K.C. Jain, Dr. L.N.Agarwal – Khanna Publications
2. Robotics Technology and flexible automation – S.R.Deb, S.Deb – McGrawHill Publications
3. A text book on Industrial robotics - Ganesh. S. hegde - University science press

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 455**

Semester: **V**

Subject Title: **COMMUNICATION SYSTEM LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Communication System Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Circuit Diagram	35
2	Connection	10
3	Execution and Equipment handling	15
4	Result and Graph	10
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	DC Regulated power supply	0-30V, 1A	8
2	Signal Generator	1MHz	4
3	Dual trace CRO	20 MHz / 30MHz	4
4	Digital Multi meter	---	4

5	Fiber optic Kit	---	1
8	Computers for Simulation Experiments	---	3
9	Software – PSPICE / Multi Sim / ORCAD / Tina	---	(Any 1)

M455 - COMMUNICATION SYSTEM LAB

List of experiments to be conducted using Hardware

1. Construct and test an AM modulator and detector circuit.
2. Determine the frequency response of the loudspeaker and microphone
3.Construct and test a three way crossover network.
4.Trace the input and output waveforms for ASK modulation and demodulation.
5. Set up and test the fibre optic analog and digital links.
6.Measure the bending loss and propagation loss in fiber optics.
7. Construct and test the performance of series and shunt equalizer
8. Construct and test symmetrical T and Pi attenuators.
9.Time Division Multiplexing of signals (Transmitter and Receiver)
10.Construct and test PCM transmitter and receiver circuits.

List of experiments to be conducted using Simulation

11. Trace the input and output waveforms for PSK modulation and demodulation.
12. Trace the input and output waveforms for FSK modulation and demodulation.
13. Construct and test an FM modulator circuit.
14.Construct and test PWM generation and detection circuits.
15.Construct and test PAM generation and detection circuits.

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 456**

Semester: **V**

Subject Title: **MICROCONTROLLER LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Microcontroller Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Program	35
2	Algorithm / Flowchart	10
3	Execution and Result	25
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	Microcontroller Trainer Kits	8051 μC	8
2	Add on Boards for interfacing experiments	---	Each 1
3	Software – Proteus/ MCS 51 / KeilμVision	----	(Any 1)

M 456 – MICROCONTROLLER LAB

List of experiments to be conducted using hardware

1. Arithmetic operations (Addition, Subtraction, multiplication and division of 8 bits)
2. Programs to implement mathematical functions (8 bit operands only)
    a) square root
    b) GCD
3. Program for search a given character in a string.
4. Program to find the number of characters, words in sentence.
5. Check given string is palindrome or not (using index addressing mode)
6. Program using timer and counter (use timer 1 or timer 2)
7. Program using interrupt

Interfacing with application boards

8. 4 bit binary counters (up, down, up down and ring)
9. 8 bit ADC interface
10. 8 bit DAC interface

List of experiments to be conducted using simulation

11. Sending data through serial port between two micro controller kits
12. Read the temperature using LM 39 sensor.
13. LCD interface
14. DC Motor
15. Testing logic gates (Basic and Universal gates only)

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 457**

Semester: **V**

Subject Title: **VLSI LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Dura tion
VLSI Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Interfacing Circuit Diagram	10
2	Program	30
3	Execution and Result	20
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	VLSI Trainer Kits	SPARTRAN 3 / 3E FPGA	8
2	Add on Boards for interfacing experiments	---	Each 1
3	Software – Xilinx / Model Sim / Altera	----	(Any 1)

M457 -VLSI Lab

List of experiments to be conducted using Hardware

1. VHDL Implementation for the combinational circuits
    a) multiplexor
    b) demultiplexor
    c) encoder
    d) decoder
2. VHDL Implementation for an ALU circuit having arithmetic, logic and shift operations.
3. VHDL Implementation for the sequential logic circuits
    a) D flip- flop with synchronous and asynchronous reset
    b) JK flip-flop
4. VHDL implementation of a shift register (SIPO and PIPO)
5. VHDL Implementation for Ring and Johnson counters
6. VHDL code for simple I/O operations (LED and Switches)
7. VHDL Implementation for interfacing relay and buzzer
8. VHDL Implementation for interfacing 7 segment display
9. VHDL Implementation for LCD interface
9. VHDL implementation of stepper motor interface
10. VHDL implementation of traffic light control

List of experiments to be conducted using Simulation:

11. VHDL code for a 4 variable boolean equation (either in SOP / POS)
12. VHDL code for simple addition, subtraction and multiplication (4 x 4 bits)
13. VHDL code for arithmetic circuits
    a) half and full adders
    b) half and full subtractors
14. VHDL code for 4 bit asynchronous up and down counters
15. VHDL test bench code for testing a logic gate.

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 461**

Semester: **VI**

Subject Title: **INDUSTRIAL ELECTRONICS**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Industrial Electronics	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Power Devices and Trigger Circuits	16
II	Converters and Choppers	15
III	Inverters & Applications	14
IV	Power Electronic Control	15
V	Numerical Control Systems	15
Revision and Test		15
Total		90

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 & DCS which can perform various control functions in industrial environments.

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

- To Study working principle of MOSFET, IGBT
- To Study the methods of triggering
- To learn about converters and its types.
- To understand commutation concepts in SCR
- To learn about choppers.
- To Study about inverters and types.

- To understand the concept of HVDC.
- To know about SMPS.
- To understand about UPS and its types.
- To understand the concepts of AC and DC drives
- To study about the

M461 INDUSTRIAL ELECTRONICS

Unit I - Power Devices and Trigger Circuits

Thyristor family –Working principle, VI characteristics and applications of SCR – Definitions for holding current, latching current, dv/dt rating, di/dt rating. Insulated gate bipolar transistor(IGBT), MOSFET and GTO - Symbol, principle of working, VI characteristics and applications.

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.

Unit II - Converters and Choppers (Qualitative Treatment Only)

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 of forced commutation(mention the types only).

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.

Unit III - Inverters & Applications

Inverter - Definition -Requirement of an inverter –Single phase 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 inverter using IGBT.

HVDC Transmission- principle – advantages – drawbacks, SMPS - Block diagram of SMPS – advantages and disadvantages. UPS-Type (ON Line, OFF Line), Comparison, Battery Banks.

Unit IV-Power Electronic Control (Qualitativetreatmentonly-no derivations):
Control of DC drives:

Introduction – Applications of DC drives – DC chopper for series motor drive, Fourquadrant DC – DC converter drive using MOSFET, Closed loop control of DC drives – Block description.

Control of AC drives:
Introduction – Applications of AC drives, Closed loop control of AC drives – Block description, Microcomputer based PWM control of induction motor drive-Block description.

Cyclo Converter:
Introduction, single phase to single phase cyclo converter with simple circuit.

Power Electronic Applications:
Simple battery charger circuit using SCR, Emergency lighting system – simple circuit, Simple Time-Delay Circuit using SCR and UJT.

Unit V - Numerical Control Systems
Basic concepts of numerical control - Block diagram of numerical control system– Advantages,disadvantages , applications of numerical control system –Programming systems (mention thenames only) – Data processing unit –Data reading – Part programming – steps - Post processor

Introduction to CNC – Basic concepts of CNC – Comparison between NC & CNC – Typical CNC system – Block diagram, Advantages.

REFERENCE BOOKS
1. Industrial & Power Electronics by Harish C.Rai, Umesh Publication, 5th Edition 1994
2. Power Electronics by Dr.P.S.Bimbhra, Khanna publishers -2nd Edition-1998
3. Power Electronics by M.H.Rashid-PHI Publication-3rd Edition-2005
4. Power Electronics by M.D.Singh&K.B.Khanchandani 2nd Edition-2011, TMH
5. Industrial Electronics and control by Biswanath Paul –PHI publications-2nd Ed. -2011
6. Numerical control of Machines – Yoram Korean & Joseph Ben

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 462**

Semester: **VI**

Subject Title: **EMBEDDED SYSTEM**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Embedded System	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Fundamentals of ARM	15
II	ARM Instructions Set	16
III	ARM Advance features	14
IV	LPC2148 ARM processor	15
V	Cortex ARM and applications of ARM	15
Revision and Test		15
Total		90

RATIONALE:
Increasingly, embedded systems developers and system-on-chip designers select specific microprocessor cores and a family of tools, libraries, and off-the-shelf components to quickly develop embedded system -based products. A major processor in this industry is ARM. Since 1985, the ARM architecture has become the most pervasive 32-bit architecture in the world. ARM processors are embedded in products ranging from cell/mobile phones to automotive Braking systems. A worldwide community of ARM partners and third-party vendors has Developed among semiconductor and product design companies, including hardware engineers, System designers, and software developers. This course has been to describe the operation of the ARM core from a product developer's perspective with a clear emphasis on its architecture by assuming no previous ARM experience.

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

Distinguish between CISC and RISC architecture
Understand the ARM design philosophy
Explain the ARM architecture and the pipeline structure
Describe the little and big endian methods of representation
Explain the Instruction sets of ARM processor.
Understand various operational modes in ARM processor
List the various exceptions and handling methods
Develop an assembly level code for basic arithmetic primitive operations
Understand the cache mechanism and cache policies
Explain the importance of memory protection
Learn the architecture of LPC 2148 ARM processor
Study the various peripherals related with LPC 2148
Know the basics of different Cortex family
Learn different applications of ARM
Relate and distinguish between OS and RTOS in their functionality.

M - 462 EMBEDDED SYSTEM

Unit - I Fundamentals of ARM

RISC Processors:

Introduction to RISC processors –Properties of RISC - CISC Versus RISC.

Fundamentals of Embedded System:

Definition of Embedded system – Requirements of embedded system - Features and Types of embedded system – Applications of Embedded system- Example using domestic refrigerator

ARM processor fundamentals:

Embedded System Hardware (ARM bus technology, AMBA bus protocol, memory and peripherals) - ARM coreData Flow model, Registers,Current Program Status Registerand banked registers,processor modes - states and instruction sets - Pipeline - Exceptions,Interrupts, and the Vector Table - ARMnomenclature and ARM families

Unit - II ARM Instructions Set

ARM Instruction Set - Data Processing Instructions- move, barrel shifter, arithmetic, logical, comparison and multiply- Branch Instructions, Load-Store Instructions- single and multiple register transfer, swap - Software Interrupt Instruction -Program Status RegisterInstructions - coprocessor instructions - Conditional Execution - Stack Instructions - Simple arithmetic programs in ASM (addition, subtraction and multiplication only)

Basic concepts of Thumb instructions:

Code density - thumb decoding - register usage and ARM Thumb inter-working
(No need of instructions set)

Unit - III ARM Advance features

ARM Exception Handling:

ARMprocessor exceptions and modes- vector table - exception priorities

ARM Interrupt structure:
Interrupts- Assigning interrupts - IRQ / FIQ exceptions - Enabling and disabling IRQ / FIQ- Interrupt Handling schemes - nested and non-nested (principle only and no examples needed).

ARM Cache structure:
Memory hierarchy - logical and physical cache - ARM cache architecture - operation - - ARM cache Policy - flushing and cleaning

Memory protection in ARM:
Protected regions - Access permission (basic concepts only)

Unit - IV LPC2148 ARM processor
LPC 2148 ARM controller – Block diagram – Memory and peripheral devices

ARM Peripherals:
GPIO: General Purpose Input /Output Ports - register map – Pin connect block –

Timer/ Counter: Features - Applications - Registers available in Timer/counter - Block diagram - description

UART: Universal Asynchronous Receiver/Transmitter – block diagram – features

I^2 C Interface – Features of I^2C Interface in ARM processor – Block diagram – register map – I^2C Master mode operation
Brief description about **PWM - ADC and DAC**

Unit - V Cortex ARM Processors and applications of ARM
Introduction to ARM Cortex processors (only basic principles)– Block diagram, features and comparison between Cortex – A, Cortex –R and Cortex –M processors

Applications of ARM:(Qualitative treatment only – No programs needed)
ARM – GSM Interfacing, ARM – ZigBee Interfacing, ARM – Stepper motor Interfacing, ARM –LCD Display Interfacing, ARM- Keypad Interfacing, ARM – Sensor Interfacing (Ultrasonic, Temperature, Piezoelectric & Pressure).

Introduction to RTOS: Basic Principle only – Example using blinking two LEDs.

REFERENCE BOOKS:
1) "ARM System Developer's Guide Designing and Optimizing" by Andrew N.Sloss Elsevier publication,2004.
2) "Embedded systems" B.KantaRao PHI publishers, Eastern Economy Edition, 2011
3) "Embedded Systems Architecture" - Tammy Noergaard, Newness edition, 2005
43) "ARM System-on-Chip Architecture" 2nd Edition, Steve Furbe, Pearson Education, 2000
4) Vincent Mahout, "Assembly Language programming-ARM Cortex M3", John Wiley & Sons, 2012

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**
Subject Code: **M 4631**
Semester: **VI**
Subject Title: **DATA COMMUNICATION**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Data Communication	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Computer Networks and Fundamentals	17
II	Wireless Wireless LAN	14
III	Bluetooth Technology, WAP & VSAT	15
IV	Compression Techniques	13
V	Wireless Sensor Networks	15
Revision and Test		5
Total		90

RATIONALE:
Students of EC Engineering need to possess good understanding of the fundamentals of networking and various networking standards and protocols. This course imparts a unified systems view of the broad field of data and computer communications. The fundamental principles of data communications are thoroughly presented and then applied in data communication networking.

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

- Independently understand basic computer network technology.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Understand the wireless LAN concept and its types
- Learn about the GSM and CDMA technology

- Study the Bluetooth and WAP principles
- Understand the VSAT technology
- Learn different types of data compression techniques
- Know the basic concepts of audio compression
- Know the basics of wireless sensors
- Study the basic concepts of different wireless technologies

M 4631 - DATA COMMUNICATION

Unit - I Computer Networks and Fundamentals

Introduction to LAN network: Network fundamentals – Applications – Advantages of Networks - Classification of Network based on geographical area (LAN, MAN, WAN) – Network topology – Star – Ring –Mesh – Bus – Tree – Internet and Intranet.

Media of Transmission: Open wire – Twisted pair – Coaxial cable – Fiber optic cable Network Hardware: Hub – Ethernet – Bridges –Routers (Principle only) -Data sets and interconnection requirements – classification of modems.

OSI Model: Block diagram of OSI Model – Layers – Functions of each layer.

TCP/IP: Overview of TCP/IP – OSI & TCP/IP – Transport Layers Protocol– TCP & UDP - Network Layers Protocol – IP – Interior Gateway Protocols (IGMP, ICMP, ARP, RARP Concept only). IP Addressing – Subnetting&Supernetting

Unit - II Wireless LAN

Introduction to Wireless LANs: Definition – Need – Advantages and Disadvantages of WLAN – Applications of WLAN – Components of Wireless LAN – Types of Wireless LAN – Infrared versus radio transmission – Protocols used in WLAN – Digital Cellular System – GSM – Services and Architecture – Radio Subsystem – CDPD – CDMA – Uses of WLAN

HIPERLAN: Introduction – Protocol Architecture.

Unit - III Bluetooth Technology, WAP & VSAT

Bluetooth: Introduction – Evolution – Need – Bluetooth Radio: Vertical Antenna – Dipole Antenna – Antenna parameters – Ad hoc network – Bluetooth Protocol Architecture – Advantages – Applications – Comparison of wireless LAN and Bluetooth technology.

Wireless Access Protocol: Advantages – Services – WAP architecture –Applications.

Introduction to VSAT: VSAT Technology – VSAT bands- Components of a VSAT System – Access schemes of VSAT – TDMA – FDMA – CDMA – DAMA – VSAT topology – Advantages and pitfalls - Applications

Unit - IV Compression Techniques

Data Compression: Coding – Run length encoding - Shannon - Fano Algorithm –

Huffman code- Adaptive Huffman coding – updating – swapping – Overflow –Escape Code – Dictionary based Compression - Encoding and decoding – Static Versus Dynamic Dictionary – Arithmetic Encoding

Audio and Video Compression: Fundamentals of digital audio and video Concepts – Lossy and Lossless audio compression (basic principle only) – MP3 Compression – Silence compression – JPEG compression - MPEG compression

Unit - V Wireless Sensor Networks (No derivation and Problems – Qualitative treatment only)

Wireless Sensor Networks: Definition – Applications of WSN –Advantages and limitations – Wireless Sensor network Architecture –Principle of Hardware and Software subsystems – Wireless technologies – RF tag – Bluetooth (low energy).
LoRaWAN – Zigbee and Hotspot (WiMAX) – (basic concepts only) – Comparison BetweenWiFi and WiMax

3G and 4G cellular networks – Protocol structure – principle and advantages – Comparison of 2G, 3G and 4G networks

REFERENCE BOOKS:

1. Mobile Communications -Jochen Schiller Pearson Education, New Delhi.
2. Wireless Communication of Networks - William Stallings - PHI
3. BlueTooth - Demystified Nathan J.Muller Tata McGraw – Hill
4. The Data Compression Book, second edition – Mark Nelson and Jean Loup Gailly– BPB publications
5. Wireless Sensor Networks – Technology, Protocol and Applications – Kazem Sohraby, Daniel Minoli and TaiebZnati - John Wiley & Sons, 2007.
6. Computer Networks: Fundamentals and Applications – R.S.Rajesh, K.S. Eswarakumar, R. Balasubramanian

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 4632**

Semester: **VI**

Subject Title: C **PROGRAMMING**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Dura tion
C Programming	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Program Development & Introduction to C	17
II	Decision Making, Arrays and Strings	14
III	Functions , Structures And Unions	15
IV	Pointers	14
V	File management & Pre-processors	15
Revision and Test		15
Total		90

RATIONALE:
C' is the most widely used computer language, which is being taught as a core course. C is general purpose structural language that is powerful, efficient and compact, which combines features of high level language and low-level language. It is closer to both Man and Machine. Due to this inherent flexibility and tolerance it is suitable for different development environments. Due to these powerful features, C has not lost its importance and popularity in recently developed and advanced software industry. C can also be used for system level programming and it is still considered as first priority programming language. This course covers the basic concepts of C. This course will act as "Programming concept developer" for students.

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

- Define Program, Algorithm and flow chart
- List down and Explain various program development steps

- Write down algorithm and flow chart for simple problems.
- Describe the concepts of Constants, Variables, Data types and operators.
- Develop programs using input and output operations.
- Understand the structure and usage of different looping and branching statements.
- Define arrays and string handling functions.
- Explain user-defined functions, structures and union.
- To understand the dynamic data structure and memory management
- To understand the various pointer operations related to C
- To learn about the various File handling techniques

M 4632 – C PROGRAMMING

UNIT – I Program Development & Introduction to C

Program: Program Definition - Program development cycle – Programming Languages – Low Level language – High Level Language – Features of a good programming languages

Algorithm and Flow chart: Algorithm – Definition – Properties of an Algorithm – Classification of Algorithms – Algorithm logic - Flow Chart – Importance of Flowchart, Flow chart symbols, Advantages of flow chart – Limitation of flowcharts, Algorithm and flow chart for the following problems: Examples on Algorithms: Area & circumference of circle, to find the product of first n natural numbers , Largest of 3 numbers, Number odd or even, factorial of a given number

Introduction to C: History of C - Features of C Language - Structure of a Cprogram– Execution of C Program : - Compiling, Link and Run a program -Diagrammatic representation of program execution process

Variables and Constants: C character set - tokens- constants- keywords –identifiers and variables- - data types and storage – data type Qualifiers -Declaration of variables – Assigning values to variables – Escape sequences -defining symbolic constants

C operators: Arithmetic, Logical, assignment, relational, increment and decrement, conditional, bit wise, special - operator precedence- C expressions –Arithmetic expressions – evaluation of expressions – type conversions in expressions – type cast operator - operator precedence and associatively

I/O statements : Formatted input, formatted output, Unformatted I/O statements

UNIT – II Decision Making, Arrays and Strings

Decision making and branching: Introduction – simple if statement - if-else -else-if ladder, nested if-else - switch statement - the go to statement – Simple programs

Looping Statements: while, do-while statements, for loop, break & continue statement –- simple programs

Arrays: Declaration and initialization of one dimensional, two dimensional and character arrays, accessing array elements. – Programs using arrays

Strings: Declaration and initialization of string variables, reading string, writing strings, - string handling functions from standard library (strlen( ), strcpy( ), strcat( ), strcmp( )).- String manipulation programs

Unit – III Functions , Structures And Unions

Built-in functions: Math functions - console I/O functions - Standard I/O functions - Character Oriented functions - graphical functions – Simple programs

User defined Functions: Need of user defined functions, scope and life time of variables, defining functions, function call (call by value, call by reference), return values, storage classes. category of function(No argument No return value, No argument with return value, argument with return value), - Recursion

Structures and Unions: Structure - definition, Initialization, Comparison of structure variables, Arrays of Structures, Arrays within structures, Structures with in structures, Structures and functions – Unions – structure of Union- Difference between Union and structure.

UNIT – IV Pointers

Pointers: Introduction – Advantages of pointers - Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer - Pointers expressions, Increments and scale factor - Array of pointers -Relation between Pointers and Arrays - string manipulation using pointers –Limitation of array of pointers to strings - Pointers and functions, Pointers and structures.

Dynamic memory Management: Introduction - functions - Memory allocation process – Allocating a block of memory : MALLOC – Allocation of multiple blocks of memory : CALLOC – Releasing the used space: FREE – Altering the size of the block: REALLOC

UNIT – V File management & Preprocessors

File Management: Introduction – Defining and Opening a file - Closing a file - Input/output operations on files – Error handling during I/O Operations - Random access to files – Programs using files

Command line arguments: Introduction – argv and argc arguments – Programs using Command Line Arguments

The Preprocessor: Introduction - Macro substitution, File inclusion, Compiler control directives

REFERENCE BOOKS

1. Programming in ANSI C E.Balagurusamy Tata Mc-Graw Hill, New Delhi
2. Programming and Problem solving using CISRD Group ,Lucknow Tata Mc-Graw Hill, New Delhi 2010
3. Let us C YeswanthKanetkar BPB Pulications

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 4633**

Semester: **VI**

Subject Title: **COMPUTER HARDWARE AND NETWORK**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Computer Hardware And Network	6	90	25	75	100	3 Hrs

Topics and allocation of hours

Unit	Topic	Time (Hrs)
I	Motherboard Components And Memory Storage Devices	17
II	I/O Devices And Interface	16
III	Maintenance And Trouble Shooting Of Desktop And Laptops	13
IV	Computer Network Devices And OSI Layers	15
V	802.X And TCP/IP Protocols	14
Revision and Test		15
Total		90

RATIONALE:
Maintaining and servicing the computers, laptops and peripherals are essential requirements of the computer students. The clear understanding of computer network devices and protocols are also taught in this subject.

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

- On completion of the following units of syllabus contents, the students can
- Identify the major components of CPU.
- Understand the principle of operations of all the interfacing boards, IO/Memory slots and interfacing devices.
- Know the use of diagnostic Software.
- Trouble shoot the problems in Laptop.

- Understand the different layers of OSI and their functions. Compare different LAN protocols.
- Identify the protocols used in TCP /IP and compare with OSI model. Use of IP addressing and TCP/ IP protocols briefly

M – 4633 COMPUTER HARDWARE AND NETWORK

Unit I - Motherboard Components And Memory Storage Devices

Introduction: Parts - Mother board, expansion slots, memory, powersupply, drives and front panel and rear panel connectors – Hardware,Software and Firmware.

Processors: Architecture and block diagram of multicore Processor,Features of new processor(Definition only)-chipsets (Concepts only)

Bus Standards Overview and features of PCI, AGP, USB,PCMCIA, Processor BUS - High Speed Bus

Primary Memory: Introduction-Main Memory, Cache memory –DDR2-DDR3, RAM versions – 1TB RAM – Direct RDRAM

Secondary Storage: Hard Disk – Construction – Working Principle –Specification of IDE, Ultra ATA, Serial ATA; HDD Partition - Formatting.Troubleshooting hard disk drives.

Removable Storage: CD&DVD construction – reading &writingoperations; CD-R,CD-RW; DVD-ROM, DVD-RW; construction and workingof DVD Reader / Writer.Blue-ray: Introduction – Disc Parameters – Recording and Playback
Principles – Solid state memory devices

Unit II - I/O Devices And Interface

Keyboard and Mouse: Keyboard: Signals – operation of membraneand mechanical keyboards–troubleshooting; wireless Keyboard. Mousetypes,connectors, operation of Optical mouse and Troubleshooting.

Printers: Introduction – Types of printers– Dot Matrix, Inkjet, Laser, lineprinter, MFP (Multi Function Printer), Thermal printer - Operation –Construction – Features and Troubleshooting

I/O Ports: Serial, Parallel, USB, Game Port, Bluetooth interface, IRconnector, fire ware, Signal specification problems with interfaces.

Displays and Graphic Cards: Panel Displays– Principles of LED, LCDand TFT Displays. VGA and SVGA card.
Modem: Working principles – Broadband modems only (USB) -common problems and solutions

Power Supply: Servo Stabilizers, online and offline UPS –workingprinciples; Surge suppressors and spike isolators. SMPS: Principles ofOperation and Block Diagram of ATX Power Supply, connectorSpecifications.

Unit III - Maintenance And Trouble Shooting Of Desktop And Laptops

Bios-setup: Standard CMOS setup, Advanced BIOS setup, Powermanagement, advanced chipset features, PC Bios communication –upgrading BIOS, Flash BIOS -setup.
POST: Definition – IPL hardware – POST Test sequence – beep codesand error messages.

Diagnostic Software and Viruses: Computer Viruses – Precautions –Anti-virus Software – identify the signature of viruses – Firewalls and latestdiagnostic software's.

Laptop: Difference between laptop and desktop- Types of laptop –block diagram – working principles–configuring laptops and power settings -SMD components, ESD and precautions.

Laptop components: Adapter – types, Battery – types and basicproblems, RAM– types, CPU – types, Laptop Mother Board - block diagram,Laptop Keyboard - Touchpad

Installation and Troubleshooting: Formatting, Partitioning andInstallation of OS – Trouble Shooting Laptop Hardware problems -Preventive maintenance techniques for laptops.

Unit IV - Computer Network Devices And OSI Layers

Data Communication: Components Of A Data Communication – Dataflow: simplex – half duplex – full duplex; Networks – Definition –Networkcriteria – Types of Connections: Point to point – multipoint; Topologies: Star,Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of eachtopology.

Types of Networks: LAN – MAN – WAN – CAN – HAN – Internet –Intranet –Extranet, Client-Server, Peer To Peer Networks.

Transmission Media : Classification of transmission media - Guided –Twisted pair, Coaxial, Fiber optics; Unguided – Radio waves – Infrared –LOS – VSAT – cabling and standards

Network devices: Features and concepts of Switches – Routers(Wiredand Wireless) – Gateways**.**

Network Models: Protocol definition - standards - OSI Model – layeredarchitecture – functions of all layers**.**

Unit V - 802.X And TCP/IP Protocols

Overview of TCP / IP: OSI & TCP/IP – Transport Layers Protocol –connection oriented and connectionless Services – Sockets - TCP & UDP.

802.X Protocols : Concepts and PDU format of CSMA/CD (802.3) –Token bus (802.4) – Token ring (802.5) – Ethernet – type of Ethernet (FastEthernet, gigabit Ethernet) – Comparison between 802.3, 802.4 and 802.5

Network Layers Protocol: IP –Interior Gateway Protocols (IGMP,ICMP, ARP, RARP Concept only).

IP Addressing : Dotted Decimal Notation –Subnetting&Supernetting –VLSM Technique-IPv6 (concepts only)

Application Layer Protocols: FTP– Telnet – SMTP– HTTP – DNS –POP.

REFERENCE BOOKS:

1. IBM PC and CLONES, B.Govindrajalu, Tata McGrawhill Publishers
2. Computer Installation and Servicing, D.Balasubramanian, Tata McGraw Hill
3. Troubleshooting, Maintaining and Repairing PCs, Stephen J Bigelow ,Tata McGraw HillPublication ,Troubleshooting Maintaining and Repairing PCs
4. Upgrading and repairing laptops, Scott Mueller, QUE Publication, Upgrading and repairing laptops
5. Data Communication and networking, BehrouzA.Forouzan, Tata Mc-Graw Hill, New Delhi,

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 464**

Semester: **VI**

Subject Title: **EMBEDDED SYSTEM LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Embedded System Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Program	35
2	Algorithm / Flowchart	10
3	Execution and Result	25
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	ARM Processor Trainer Kits	LPC 2148	6
2	Add on Boards for interfacing experiments	---	Each 1
3	Software – Proteus/ KeilμVision	----	(Any 1)

M 464 -EMBEDDED SYSTEM LAB

Programs to be performed in Embedded C using Hardware

1. Relay Interface
2. Buzzer Interface
3. Stepper motor Interface (clock wise and counter clock wise)
4. Interface of Seven Segment display
5. Program for Traffic light control
6. LCD interface
7. Program for timer operation using polled method
8. Program for timer operation using Interrupt driven method
9. Program for serial operation
10. Program for ADC operation

List of experiments to be conducted using simulation

Programs to be performed in ASM

11. Simulation of Arithmetic operations on ARM
12. Simulation of assembly level program for soft delay
13. LED blinking (simple blinking, ring and up counters)
14. I/O operation in ASM
15. Interface with LEDs and Switches using Embedded C

Note: Manual containing List of IO registers (SFR for IO) can be given to the students for the End Practical Examination)

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 465**

Semester: **VI**

Subject Title: **INDUSTRIAL ELECTRONICS LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Industrial Electronics Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Circuit Diagram	35
2	Connection	10
3	Execution and Equipment handling	15
4	Result and Graph	10
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	DC Regulated power supply	0-30V, 1A	3
2	DC Regulated power supply	0-300V, 1A	1
3	Dual trace CRO	20 MHz / 30MHz	1
4	Digital Multi meter	---	4
5	PLC trainer kits	---	3
6	Add on Boards for PLC experiments	---	Each 1
7	Computers for Simulation Experiments	---	3
8	Software – PSPICE / Multi Sim / ORCAD / Tina	---	(Any 1)

M465 -INDUSTRIAL ELECTRONICS PRACTICAL

Study Experiments: (Not for Examination)

1. Write and implement a program for CNC lathe involving linear position, circular interpolation and repeat cycle.
2. Write and implement a program for CNC milling for a simple component involving linear position and interpolation.

List of experiments to be conducted using Hardware

1. Determine the phase control characteristics of SCR.
2. Construct and test commutation circuits of SCR.
3. Construct a Lamp dimmer using TRIAC
4. Construct and test a single phase inverter.
5. Construct a phase controlled half (wave) controlled rectifier using SCR. Plot the output current graph for resistive load.
6. Construct and test Tube light emergency light.
7. Construct and test an IC based buck converter using PWM.
8. Write and implement a simple ladder logic program for interfacing a conveyer control with PLC
9. Industrial sliding door automation
    - Sequencing
    - Open ¼ th Full width
    - Wait for next go command
    - Next open full
    - wait for a time and close full
10. Burglar scare random lighting in building with variable timing. The lights in each room are switched on at pre-determined intervalsand switched off at pre-determined time. The lighting is shifted fromarea to area randomly to scare the burglars with a false fear ofpresence of people.

List of experiments to be conducted using simulation

11. Construct and draw theV- I characteristics of SCR and find its break over voltage.
12. Construct a circuit to test and plot the V- I characteristics of DIAC and TRIAC.
13. Construct and test the performance of the photo relay using photo transistor.
14. Construct a sequence timer using 555 Timer chip.
15. Write and implement a simple ladder logic program using digital inputs and outputs for PLC

M SCHEME
(Implemented from the Academic year 2017- 2018 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 4661**

Semester: **VI**

Subject Title: **ROBOTICS LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Robotics Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Circuit Diagram	30
2	Procedure	10
3	Execution and Equipment Handling	25
4	Result	05
5	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S.No	Name of the Equipments	Required Nos.
1	Robotic Kits (AVR / ARM / 8051)	6 Nos
2	Add on Boards for interfacing	Each 1
3	Desktop / Laptop	6

M4661 – ROBOTICS LAB

Programs using AVR / ARM /8051 controller for robotics:

1. LED blinking
2. Forward and backward motion control
3. Left and right motion
4. Circular motion control
5. Buzzer interfacing
6. Relay interfacing
7. LCD
8. ADC sensor interfacing
9. Servo motor interfacing
10. Gripper [pick and place]
11. Line follower
12. Velocity Control

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 4662**

Semester: **VI**

Subject Title: **CPROGRAMMING LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
C Programming Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Writing Program	35
2	Algorithm / Flowchart	10
3	Execution and Result	25
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Range	Required Nos.
1	Desktops and Laptops	----	6
2	Laser Printer	----	1
3	Software (C Compiler and Editor)	----	1

M 4662 - C PROGRAMMING LAB

List of experiments to be conducted

1. Write a C Program to calculate Simple and Compound interest
2. Write C language program to find the solution of a quadratic equation.
3. Write C language program to find whether the given number is a positive number, negative number or zero.
4. Write C language program to find the sum of series using While loop.
5. Write C language program to perform the Arithmetic operation based on the numeric key press using switch case statement. (1-Addition, 2-Subtraction, 3 – multiplication, 4 - Division).
6. Write C language program to implement Ohms Law.
7. Write C language program to find factorial of given N numbers using function.
8. Write C language program to prepare the total marks for N students by reading the Name, Reg.No, Marks 1 to Marks 6 using array of structure.
9. Write C language program to swap the values of two variables.
10. Read a string, which consists of both lower case characters and upper case characters. Convert the lowercase character into upper case and vice versa.
    Display the new string.
11. Write a function to calculate the sum and average of given three numbers. Write a main function to call the above function
12. Using pointers, find the length of the given string.
13. Write a program to read an integer number and find the sum of all individual digits.
14. Write a program to arrange the given N names in alphabetical order.
15. Program to copy contents of one file to another file. Also find the number of characters, lines and words in the above file

M SCHEME

(Implemented from the Academic year 2017- 2018 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 4663**

Semester: **VI**

Subject Title: **COMPUTER HARDWARE AND TEST ENGINEERING LAB**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Computer Hardware And Test Engineering Lab	4	60	25	75	100	3 Hrs

Allocation of marks

No	Allocation	Marks
1	Procedure	30
2	Execution	30
3	Result with Print out	10
4	Viva voce	05
Total		75

EQUIPMENTS REQUIRED:

S. No	Name of the Equipments	Required Nos.
1	Computer with Pentium / Core processors with inbuilt NIC	12
2	Hard disk drive	2
3	CDD/ DVD Writer	2
4	Hard disk drive	2
5	Blank Blu-ray disk	12
6	Web camera	2
7	Laser Printer	2

8	Dot matrix Printer	2
9	Blank DVD	12
10	Scanner	2
11	Laptop	2
12	Bio metric device	2
13	PCB Shorts Locator Trainer	2
14	V-I Characteristics Trainer System	
15	Functional Testing Trainer System	12
16	In-Circuit Measurement Trainer System	1
17	Boundary Scan Test Trainer System	2
18	Digital And Analog Simulator	
19	PCB Shorts Locator Trainer	2
20	OS – Windows XP / Windows 7 / Linux	1
21	CD burning software (Nero)	1

M 4663 - COMPUTER HARDWARE AND TEST ENGINEERING LAB

1. Identification of System Layout.

a. Front panel indicators & switches and Front side & rear side connectors.
b. Familiarize the computer system Layout: Marking positions of SMPS, mother board, FDD, HDD, CD, DVD and add on cards.
c. Configure BIOS setup program and troubleshoot the typical problems using BIOS utility.

2 **HARD DISK**

a. Install Hard Disk.
b. Configure CMOS-Setup.
c. Partition and Format Hard Disk.
d. Identify Master /Slave / IDE Devices.
e. Practice with scan disk, disk cleanup, disk De-fragmenter, Virus Detecting and Rectifying Software.

3 a) Install and Configure a DVD Writer and a Blu-ray Disc writer.
b) Recording a Blank DVD and Blu-ray Disc.

4 **Printer Installation and Servicing:**

a) Head Cleaning in dot matrix printer
b) Install and configure Dot matrix printer and Laser printer
c) Troubleshoot the above printers.
d) Check and connect the data cable connectivity

5 **Install and configure** Scanner, Web cam, Cell phone and bio-metric device with system. Troubleshoot the problems

6 Assemble a system with add on cards and check the working condition of the system and install OS.

7 **Dual OS Installation**

8 Assembling and Disassembling of Laptop to identify the parts and to install OS and

configure it.

9 Do the following Cabling works in a network

a) Cable Crimping b) Standard Cabling c) Cross Cabling d) IO connector crimping

e) Testing the crimped cable using a cable tester

10. Locate a Short in a circuit Board using Short Locator.

11. Test and verify the combinational logic circuits NAND, NOR, Half adder, Half subtractors, Multiplexers, De-multiplexer, Decoder & Encoder using functional test method.

12. Test and verify the Sequential Logic Circuits D-FF, RS-FF, Latch, Counter, Shift Register using functional test method.

13. Test and verify the Memory Devices SDRAM/DRAM Chip using functional test method.

14. a. Test and verify the digital circuits in a circuit using auto compensation technique.
    b. Test and verify the open emitter circuit using pull down resistor.
    c. Test and verify the open collector circuit using pull up resistor.

15. Test the functionality of operational amplifier in Inverting, Non-inverting and voltage follower mode.

M SCHEME
(Implemented from the Academic year 2015- 2016 onwards)

Course Name: **Electronics and Communication Engineering**

Subject Code: **M 467**

Semester: **VI**

Subject Title: **PROJECT WORK**

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester: **15 Weeks**

Subject	Instruction		Examination			
	Hrs/ week	Hrs/ Sem	Internal Assessment	End Examination	Total	Duration
Project Work	6	90	25	75	100	3 Hrs

OBJECTIVES:

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment
- Get exposure on industrial environment and its work ethics. Understand what entrepreneurship is and how to become an entrepreneur.
- Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional Knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.
- Understand the facts and importance of environmental management. Understand and gain knowledge about disaster management.

M 467 PROJECT WORK

ENVIRONMENTAL & DISASTER MANAGEMENT

1. ENVIRONMENTAL MANAGEMENT

Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.

Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.

Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.

Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

Noise pollution management – Effects of noise on people – Noise control methods.

2. DISASTER MANAGEMENT

Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..

Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings -Cyclone shelters – Warning systems.

Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services - Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances –Rehabilitation.

LIST OF QUESTIONS

A. ENVIRONMENTRAL MANAGEMENT

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?
2. Define Environmental Ethic.
3. How Industries play their role in polluting the environment?
4. What is the necessity of pollution control? What are all the different organizations you know, which deal with pollution control?
5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.
6. What is meant by Hazardous waste?
7. Define Industrial waste management.
8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.
9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
10. What are the objectives of treatments of solid wastes before disposal?
11. What are the different methods of disposal of solid wastes?

B. DISASTER MANAGEMENT

1. What is meant by Disaster Management? What are the different stages of Disaster management?

2. Differentiate Natural Disasters and Man made Disasters with examples.
3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
7. Specify the role played by an Engineer in the process of Disaster management.
8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu? Specify its epicenter and magnitude.
10. Specify the Earthquake Hazard Zones in which the following towns of Tamil Nadu lie:
    (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones

****