DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

M-SCHEME (Full Time)

II and III year

2016 onwards
## CURRICULUM OUTLINE
### Diploma in Electronics and Communication Engineering (Full Time)
#### III Semester

<table>
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<tr>
<th>Subject Code</th>
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* Common to all branches
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**Elective subjects**
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**Elective subjects**

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## SCHEME OF EXAMINATION

### ELECTRONICS AND COMMUNICATION ENGINEERING

#### THIRD SEMESTER

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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

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Topics and allocation of hours

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<tr>
<td>II</td>
<td>Bipolar and unipolar Transistor</td>
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<td>III</td>
<td>Power and Opto devices</td>
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<td>IV</td>
<td>Amplifiers and Voltage regulators</td>
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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 clumpers

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 - intrinsic and extrinsic semiconductors - majority and minority carriers.

PN Junction Diode:
PN Junction diode - Forward and Reverse bias characteristics - Specifications

Zener diode:

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:**

**DIAC:**

**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 shaping 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
3. Electronics Devices & Circuits by Salivahanan, N.Suresh Kumar, A.Vallavaraj
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

<table>
<thead>
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<th>Subject</th>
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<th>Examination</th>
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Topics and allocation of hours

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<th>Unit</th>
<th>Topic</th>
<th>Time (Hrs)</th>
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<tr>
<td>I</td>
<td>Logic gates and Boolean Algebra</td>
<td>17</td>
</tr>
<tr>
<td>II</td>
<td>Arithmetic and Combinational Logic Circuits</td>
<td>15</td>
</tr>
<tr>
<td>III</td>
<td>Sequential Logic circuits</td>
<td>15</td>
</tr>
<tr>
<td>IV</td>
<td>Memory and display</td>
<td>14</td>
</tr>
<tr>
<td>V</td>
<td>CPU design</td>
<td>14</td>
</tr>
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<td></td>
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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 Multiplexer – 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:**

**Unit - IV Memory and display**
**ROM:**
Types of Memories – ROM – PROM – EPROM – UVEPROM – Flash memory – Organization of ROM – Anti fuse Technologies

**RAM:**

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:**
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**

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**Topics and allocation of hours**

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<td>II</td>
<td>A.C. Circuits and Resonance</td>
<td>14</td>
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<tr>
<td>III</td>
<td>Transformers and Machines</td>
<td>15</td>
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<tr>
<td>IV</td>
<td>Measuring Instruments and CRO</td>
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<td>V</td>
<td>Recorders and Transducers</td>
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**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)


**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
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

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<th>Examination</th>
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Allocation of marks

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<td>Connection</td>
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<td>3</td>
<td>Execution and Equipment handling</td>
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<tr>
<td>4</td>
<td>Result and Graph</td>
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EQUIPMENTS REQUIRED:

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<th>Range</th>
<th>Required Nos.</th>
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<td>1</td>
<td>DC Regulated power supply</td>
<td>0-30V, 1A</td>
<td>8</td>
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<tr>
<td>2</td>
<td>High Voltage Power Supply</td>
<td>0-250V, 1A</td>
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<td>3</td>
<td>Signal Generator</td>
<td>1MHz</td>
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<td>4</td>
<td>Dual trace CRO</td>
<td>20 MHz / 30MHz</td>
<td>5</td>
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<td>5</td>
<td>Digital Multi meter</td>
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<td>6</td>
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<td>Computers for Simulation Experiments</td>
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<td>9</td>
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**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 reversed dynamic 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 find its 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-db bandwidth.  
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 Astable multivibrator using transistors and draw the output waveform and also find its frequency.  
15. Construct diode clammers and draw the output waveforms.
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**

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<td>Viva voce</td>
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**Total** 75

**EQUIPMENTS REQUIRED:**

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<td>Computers for Simulation Experiments</td>
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<td>Software – LT Spice / Cedar Logic / Multi Sim / Tina</td>
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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 Multipllexer and De-multiplexer
7. Parity generator and checker using discrete ICs.
9. Construct and test the performance of a 4-bit asynchronous binary ripple 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**

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</tbody>
</table>
### List of experiments to be conducted using Hardware

1. Construct a circuit to verify Ohm’s law
2. Construct a circuit to verify Kirchhoff’s voltage and current law
3. Construct a circuit to verify superposition 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
14. Construct and test the performance of a photoelectric transducer
15. Extend the range of given voltmeter and ammeter

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**Note:** All students may possess their own multi-meter and soldering iron.
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**

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**EQUIPMENTS REQUIRED:**

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<tr>
<td>1</td>
<td>Desktops and Laptops</td>
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<td>2</td>
<td>Laser Printer</td>
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<td>Software</td>
<td>Microsoft Office 2007/2010/2013 (or) Open Office</td>
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**M437 - COMPUTER APPLICATIONS LAB**

List of experiments to be conducted
1. WINDOWS

**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**


**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) different formatting like font type, font size and font style etc.  
c) applying watermark  
d) header, footer and page number  
e) applying bullets and numbers.  
f) inserting a clip art

3. SPREADSHEET

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

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**

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<th>Subject</th>
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**Topics and allocation of hours**

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<th>Topic</th>
<th>Time (Hrs)</th>
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<tr>
<td>I</td>
<td>Networks, Antenna and Propagation</td>
<td>14</td>
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<tr>
<td>II</td>
<td>Amplitude Modulation</td>
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<td>III</td>
<td>Angle and Pulse Modulation</td>
<td>15</td>
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<td>IV</td>
<td>Audio systems</td>
<td>15</td>
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<tr>
<td>V</td>
<td>Video Systems</td>
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**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.

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


**Reference books**
1. Networks lines and fields – John D.Ryder, PHI
2. Electronic communication Systems – Kennedy – TMH
4. TV and Video engineering – ArvindM.Dhake – TMH.
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**

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<td>Microprocessors</td>
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**Topics and allocation of hours**

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<th>Topic</th>
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<tr>
<td>I</td>
<td>Organization and Instruction set of 8085 Microprocessor</td>
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<tr>
<td>II</td>
<td>Timing Diagrams and data transfer schemes</td>
<td>14</td>
</tr>
<tr>
<td>III</td>
<td>Interrupts and memory interface</td>
<td>15</td>
</tr>
<tr>
<td>IV</td>
<td>Peripheral interfacing and Applications of 8085</td>
<td>15</td>
</tr>
<tr>
<td>V</td>
<td>Advanced Microprocessors and Bus standards</td>
<td>14</td>
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<tr>
<td></td>
<td>Revision and Test</td>
<td>15</td>
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<tr>
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**RATIONALE:**
This course introduces microprocessor architecture and discusses the design of systems based on microprocessors. 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 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 interfacing and 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–I²C- USB Bus standard

Reference Books:
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**

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**Topics and allocation of hours**

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<th>Topic</th>
<th>Time (Hrs)</th>
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<tr>
<td>I</td>
<td>Introduction To Operational Amplifiers</td>
<td>14</td>
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<tr>
<td>II</td>
<td>Op-Amp Applications</td>
<td>17</td>
</tr>
<tr>
<td>III</td>
<td>Voltage regulators and PLL</td>
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<tr>
<td>IV</td>
<td>Waveform generators and Special Function ICs</td>
<td>15</td>
</tr>
<tr>
<td>V</td>
<td>D/A and A/D Converters and their Applications</td>
<td>14</td>
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<td>15</td>
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**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


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 - Subtracting 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 slopeAD Cand 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:
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

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<th>Subject</th>
<th>Instruction</th>
<th>Examination</th>
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Topics and allocation of hours

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<th>Topic</th>
<th>Time (Hrs)</th>
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<tbody>
<tr>
<td>I</td>
<td>Fundamentals of programmable Logic Controller</td>
<td>17</td>
</tr>
<tr>
<td>II</td>
<td>Basic fundamentals of PLC Programming</td>
<td>15</td>
</tr>
<tr>
<td>III</td>
<td>PLC wiring and ladder diagrams for field devices</td>
<td>14</td>
</tr>
<tr>
<td>IV</td>
<td>PLC Timer and counter programming</td>
<td>15</td>
</tr>
<tr>
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<td>Process control and data acquisition system</td>
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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
- To 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

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Allocation of marks

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EQUIPMENTS REQUIRED:

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<th>Required Nos.</th>
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<td>Microprocessor Trainer Kits</td>
<td>8085 µP</td>
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<td>Add on Boards for interfacing experiments</td>
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<tr>
<td>3</td>
<td>Software – Sim 8085 / GNU 8085 / Proteus</td>
<td>----</td>
<td>(Any 1)</td>
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</table>

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.
6 Code 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 data in 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**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Instruction</th>
<th>Examination</th>
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<tbody>
<tr>
<td></td>
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<td>Hrs/Sem</td>
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**Allocation of marks**

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<tbody>
<tr>
<td>1</td>
<td>Circuit Diagram</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>Connection &amp; Execution</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Result and Graph</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Viva voce</td>
<td>05</td>
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<td><strong>Total</strong></td>
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**EQUIPMENTS REQUIRED:**

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<th>Range</th>
<th>Required Nos.</th>
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<tbody>
<tr>
<td>1</td>
<td>Software – LT Spice / Multi Sim / Tina / ORCAD</td>
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<td>(Any 1)</td>
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</tbody>
</table>

**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. Astable multivibrator 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
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**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Instruction</th>
<th>Examination</th>
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<tbody>
<tr>
<td></td>
<td>Hrs/week</td>
<td>Hrs/Sem</td>
</tr>
<tr>
<td>Life And Employability Skills Lab</td>
<td>4</td>
<td>60</td>
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**Allocation of marks**

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<th>Sl. No.</th>
<th>Section</th>
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<tr>
<td>1</td>
<td>Part – A, Communication</td>
<td>30</td>
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<tr>
<td>2</td>
<td>Part – B, Entrepreneurship, Project Preparation, Productivity, Occupational Safety, Health, Hazard, Quality Tools &amp; Labour Welfare</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Part – C, Environment, Global Warming, Pollution</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>60</strong></td>
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</table>

**RATIONALE:**
Against the backdrop of the needs of the Industries, as well 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

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topics</th>
<th>Activities</th>
<th>Hours</th>
</tr>
</thead>
</table>
| 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 a project to obtain loan from bank in becoming an entrepreneur  
-- 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 |
-- prepare a presentation  
-- discuss & interact | 05 |
| V    | Environment, Global Warming, Pollution | -- taking down notes / hints  
-- answering questions  
-- fill in blanks the exact words heard | 10 |

LEARNING STRUCTURE

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

a) Listening 100 Marks

1. Deductive Reasoning Skills (taking down notes/hints) 25 Marks
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 25 Marks
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.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>When</td>
<td>Do</td>
<td>you</td>
<td>return?</td>
</tr>
<tr>
<td>b.</td>
<td>How</td>
<td>Is</td>
<td>his performance?</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Where</td>
<td>Has</td>
<td>the manager</td>
<td>gone?</td>
</tr>
</tbody>
</table>
2. Make sentences from the pattern given by changing sets of words with your own.

<table>
<thead>
<tr>
<th></th>
<th>The workers</th>
<th>are</th>
<th>on strike</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>The labourers</td>
<td>are paid</td>
<td>well</td>
</tr>
<tr>
<td>b.</td>
<td>There</td>
<td>is</td>
<td>a rest room</td>
</tr>
<tr>
<td>c.</td>
<td>These</td>
<td>are</td>
<td>the new products</td>
</tr>
<tr>
<td>d.</td>
<td>Almost everyone</td>
<td>come</td>
<td>to the company</td>
</tr>
<tr>
<td>e.</td>
<td></td>
<td></td>
<td>on motorbikes</td>
</tr>
</tbody>
</table>

3. Prepare a resume for the post of Department Manager.
4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings)

-----

**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 other word/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
5. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, 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
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**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Instruction</th>
<th>Examination</th>
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<td>Hrs/Sem</td>
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<td>Advanced Communication System</td>
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**Topics and allocation of hours**

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<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Time (Hrs)</th>
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</thead>
<tbody>
<tr>
<td>I</td>
<td>Telephone, FAX and Mobile Communication</td>
<td>15</td>
</tr>
<tr>
<td>II</td>
<td>Radar And Navigational Aids</td>
<td>15</td>
</tr>
<tr>
<td>III</td>
<td>Digital communication</td>
<td>15</td>
</tr>
<tr>
<td>IV</td>
<td>Optical communication</td>
<td>15</td>
</tr>
<tr>
<td>V</td>
<td>Satellite Communication</td>
<td>15</td>
</tr>
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<td></td>
<td>Revision and Test</td>
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</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>90</strong></td>
</tr>
</tbody>
</table>

**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 communication System - characteristics of data transmission circuits - Bandwidth requirement - speed - Baud rate - Noise - crosstalk - Distortion.

Digital codes:
ASCII, EBCDIC and Baudot codes - 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

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


Earth segment - Block diagram of Transmit receive earth station - Satellite mobile services - Basics of GPS.

Satellite services: INTELSAT, METSAT, Basics of GPRS.

Reference Books

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**

<table>
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<th>Subject</th>
<th>Instruction</th>
<th>Examination</th>
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<tr>
<td></td>
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<td>Hrs/ Sem</td>
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<td>Microcontrollers</td>
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**Topics and allocation of hours**

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<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Time (Hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Organization of 8051 Microcontroller</td>
<td>15</td>
</tr>
<tr>
<td>II</td>
<td>Instruction Set And Programming</td>
<td>17</td>
</tr>
<tr>
<td>III</td>
<td>Timer, Interrupt and Serial Programming</td>
<td>17</td>
</tr>
<tr>
<td>IV</td>
<td>8051 advanced programming concepts:</td>
<td>12</td>
</tr>
<tr>
<td>V</td>
<td>Interfacing of 8051</td>
<td>14</td>
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<tr>
<td></td>
<td>Revision and Test</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>90</td>
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**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 and Microcontroller – 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

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:
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**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Instruction</th>
<th>Examination</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hrs/ week</td>
<td>Hrs/ Sem</td>
</tr>
<tr>
<td>VLSI Principles</td>
<td>6</td>
<td>90</td>
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**Topics and allocation of hours**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Time (Hrs)</th>
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<tbody>
<tr>
<td>I</td>
<td>Basic Concepts of VHDL</td>
<td>16</td>
</tr>
<tr>
<td>II</td>
<td>Concurrent and Sequential codes</td>
<td>15</td>
</tr>
<tr>
<td>III</td>
<td>State machines and Packages</td>
<td>15</td>
</tr>
<tr>
<td>IV</td>
<td>Components, Functions and Procedures</td>
<td>14</td>
</tr>
<tr>
<td>V</td>
<td>Introduction to CPLD and FPGA</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Revision and Test</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>90</strong></td>
</tr>
</tbody>
</table>

**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 guarded 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 FOR statement - Comparison of concurrent versus sequential codes

**Unit - III State machines and Packages**
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)**
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:**
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:**
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:**
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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Instruction</th>
<th>Examination</th>
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<td></td>
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<tr>
<td>Bio Medical Instrumentation</td>
<td>6</td>
<td>90</td>
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Topics and allocation of hours

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<th>Unit</th>
<th>Topic</th>
<th>Time (Hrs)</th>
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<tr>
<td>I</td>
<td>Bio Potential Electrodes And Recorders</td>
<td>15</td>
</tr>
<tr>
<td>II</td>
<td>Therapeutic Instruments</td>
<td>15</td>
</tr>
<tr>
<td>III</td>
<td>Clinical Instruments</td>
<td>15</td>
</tr>
<tr>
<td>IV</td>
<td>Modern Imaging Techniques</td>
<td>15</td>
</tr>
<tr>
<td>V</td>
<td>Telemedicine and Patient Safety</td>
<td>15</td>
</tr>
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<td></td>
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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 implantable pacemaker – 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:

Specialized medical instruments:

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
4. Kumara doss – Medical Electronics.

**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**

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**Topics and allocation of hours**

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<th>Topic</th>
<th>Time (Hrs)</th>
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<tr>
<td>I</td>
<td>Design of Power supply</td>
<td>15</td>
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<tr>
<td>II</td>
<td>Design of small signal amplifiers</td>
<td>16</td>
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<tr>
<td>III</td>
<td>Data acquisition system</td>
<td>14</td>
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<tr>
<td>IV</td>
<td>Design of function generators</td>
<td>15</td>
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<tr>
<td>V</td>
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**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

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:
2. DC Power Supply Handbook, Agilent Technologies
3. The art of electronics by Paul Horowitz, Cambridge University Press
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**

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**Topics and allocation of hours**

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<th>Unit</th>
<th>Topic</th>
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<tr>
<td>I</td>
<td>Basic Concepts of Robotics</td>
<td>15</td>
</tr>
<tr>
<td>II</td>
<td>Robot Hands</td>
<td>16</td>
</tr>
<tr>
<td>III</td>
<td>Robot brain and muscles</td>
<td>14</td>
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<tr>
<td>IV</td>
<td>Robot vision</td>
<td>15</td>
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<tr>
<td>V</td>
<td>Applications of Robot</td>
<td>15</td>
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<td></td>
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**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 - Difference 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**
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

<table>
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<th>Subject</th>
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<th>Hrs/Sem</th>
<th>Internal Assessment</th>
<th>End Examination</th>
<th>Total</th>
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<td>Communication System Lab</td>
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<td>60</td>
<td>25</td>
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**Allocation of marks**

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<th>Marks</th>
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<td>2</td>
<td>Connection</td>
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<td>3</td>
<td>Execution and Equipment handling</td>
<td>15</td>
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<td>4</td>
<td>Result and Graph</td>
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**EQUIPMENTS REQUIRED:**

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<th>Range</th>
<th>Required Nos.</th>
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<tbody>
<tr>
<td>1</td>
<td>DC Regulated power supply</td>
<td>0-30V, 1A</td>
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</tr>
<tr>
<td>2</td>
<td>Signal Generator</td>
<td>1MHz</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Dual trace CRO</td>
<td>20 MHz / 30MHz</td>
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</tr>
<tr>
<td>4</td>
<td>Digital Multi meter</td>
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<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Fiber optic Kit</td>
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<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Computers for Simulation Experiments</td>
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<td>9</td>
<td>Software – PSPICE / Multi Sim / ORCAD / Tina</td>
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</table>

**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.
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**

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<th>Instruction</th>
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**Allocation of marks**

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<td>Program</td>
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<tr>
<td>2</td>
<td>Algorithm / Flowchart</td>
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**EQUIPMENTS REQUIRED:**

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<td>Microcontroller Trainer Kits</td>
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<td>Add on Boards for interfacing experiments</td>
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<td>Software – Proteus/ MCS 51 / KeilµVision</td>
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</table>
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

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<th>Marks</th>
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<td>Program</td>
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<th>Required Nos.</th>
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<td>Software – Xilinx / Model Sim / Altera</td>
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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
10. VHDL implementation of stepper motor interface
11. 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

<table>
<thead>
<tr>
<th>Subject</th>
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Topics and allocation of hours

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<th>Unit</th>
<th>Topic</th>
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<td>I</td>
<td>Power Devices and Trigger Circuits</td>
<td>16</td>
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<td>II</td>
<td>Converters and Choppers</td>
<td>15</td>
</tr>
<tr>
<td>III</td>
<td>Inverters &amp; Applications</td>
<td>14</td>
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<td>IV</td>
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<td>V</td>
<td>Numerical Control Systems</td>
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RATIONALE:
The rationale behind 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

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)

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 (Qualitative treatment only-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
5. Industrial Electronics and control by Biswanath Paul –PHI publications-2nd Ed. -2011
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

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Topics and allocation of hours

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<td>I</td>
<td>Fundamentals of ARM</td>
<td>15</td>
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<tr>
<td>II</td>
<td>ARM Instructions Set</td>
<td>16</td>
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<tr>
<td>III</td>
<td>ARM Advance features</td>
<td>14</td>
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<tr>
<td>IV</td>
<td>LPC2148 ARM processor</td>
<td>15</td>
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<td>V</td>
<td>Cortex ARM and applications of ARM</td>
<td>15</td>
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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 Register and banked registers, processor modes - states and instruction sets - Pipeline - Exceptions, Interrupts, and the Vector Table - ARM nomenclature 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 Register Instructions - 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:
ARM processor 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

I²C Interface – Features of I²C Interface in ARM processor – Block diagram – register map – I²C 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)

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

REFERENCE BOOKS:
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**

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Topics and allocation of hours

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<th>Unit</th>
<th>Topic</th>
<th>Time (Hrs)</th>
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<tr>
<td>I</td>
<td>Computer Networks and Fundamentals</td>
<td>17</td>
</tr>
<tr>
<td>II</td>
<td>Wireless Wireless LAN</td>
<td>14</td>
</tr>
<tr>
<td>III</td>
<td>Bluetooth Technology, WAP &amp; VSAT</td>
<td>15</td>
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<td>IV</td>
<td>Compression Techniques</td>
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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**


**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.


**Unit - II  Wireless LAN**


**HIPERLAN:** Introduction – Protocol Architecture.

**Unit - III Bluetooth Technology, WAP & VSAT**


**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 –

**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)**


**REFERENCE BOOKS:**
2. Wireless Communication of Networks - William Stallings - PHI
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

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<tr>
<td>II</td>
<td>Decision Making, Arrays and Strings</td>
<td>14</td>
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<td>Functions, Structures And Unions</td>
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<td>IV</td>
<td>Pointers</td>
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<td>V</td>
<td>File management &amp; Pre-processors</td>
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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 C program- 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


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
3. Let us C YeswanthKanetkar BPB Publications
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

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<tr>
<td>II</td>
<td>I/O Devices And Interface</td>
<td>16</td>
</tr>
<tr>
<td>III</td>
<td>Maintenance And Trouble Shooting Of Desktop And Laptops</td>
<td>13</td>
</tr>
<tr>
<td>IV</td>
<td>Computer Network Devices And OSI Layers</td>
<td>15</td>
</tr>
<tr>
<td>V</td>
<td>802.X And TCP/IP Protocols</td>
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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


**Principles** – Solid state memory devices

**Unit II - I/O Devices And Interface**

**Keyboard and Mouse:** Keyboard: Signals – operation of membrane and mechanical keyboards – troubleshooting; wireless Keyboard. Mouse types, connectors, operation of Optical mouse and Troubleshooting.

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

**I/O Ports:** Serial, Parallel, USB, Game Port, Bluetooth interface, IR connector, fire wire, Signal specification problems with interfaces.

**Displays and Graphic Cards:** Panel Displays – Principles of LED, LCD and 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 – working principles; Surge suppressors and spike isolators. SMPS: Principles of Operation and Block Diagram of ATX Power Supply, connector specifications.
**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 codes and error messages.

**Diagnostic Software and Viruses:** Computer Viruses – Precautions – Anti-virus Software – identify the signature of viruses – Firewalls and latest diagnostic 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 basic problems, RAM- types, CPU – types, Laptop Mother Board - block diagram,Laptop Keyboard - Touchpad

**Installation and Troubleshooting:** Formatting, Partitioning and Installation 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 – Network criteria – Types of Connections: Point to point – multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of each topology.

**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 (Wired and Wireless) – Gateways.

**Network Models:** Protocol definition - standards - OSI Model – layer architecture – 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 (Fast Ethernet, 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)


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 Hill Publication, Troubleshooting Maintaining and Repairing PCs
4. Upgrading and repairing laptops, Scott Mueller, QUE Publication, Upgrading and repairing laptops
5. Data Communication and networking, Behrouz A. Forouzan, Tata McGraw 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

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Allocation of marks

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<td>Algorithm / Flowchart</td>
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<td>3</td>
<td>Execution and Result</td>
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EQUIPMENTS REQUIRED:

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<td>ARM Processor Trainer Kits</td>
<td>LPC 2148</td>
<td>6</td>
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<tr>
<td>2</td>
<td>Add on Boards for interfacing experiments</td>
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<td>Each 1</td>
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<tr>
<td>3</td>
<td>Software – Proteus/ KeilµVision</td>
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<td>(Any 1)</td>
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</table>
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**

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<td>4</td>
<td>Result and Graph</td>
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<tbody>
<tr>
<td>1</td>
<td>DC Regulated power supply</td>
<td>0-30V, 1A</td>
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<td>2</td>
<td>DC Regulated power supply</td>
<td>0-300V, 1A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Dual trace CRO</td>
<td>20 MHz / 30MHz</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Digital Multi meter</td>
<td>---</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>PLC trainer kits</td>
<td>---</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Add on Boards for PLC experiments</td>
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<td>Each 1</td>
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<tr>
<td>7</td>
<td>Computers for Simulation Experiments</td>
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<tr>
<td>8</td>
<td>Software – PSPICE / Multi Sim / ORCAD / Tina</td>
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M46 - 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.
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 intervals and switched off at pre-determined time. The lighting is shifted from area to area randomly to scare the burglars with a false fear of presence of people.

List of experiments to be conducted using simulation
11. Construct and draw the V-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**

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<td>4</td>
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**EQUIPMENTS REQUIRED:**

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<th>Name of the Equipments</th>
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<tbody>
<tr>
<td>1</td>
<td>Robotic Kits (AVR / ARM / 8051 )</td>
<td>6 Nos</td>
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<td>2</td>
<td>Add on Boards for interfacing</td>
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<tr>
<td>3</td>
<td>Desktop / Laptop</td>
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</table>
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: C PROGRAMMING LAB

TEACHING AND SCHEME OF EXAMINATION:

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

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<td>Execution and Result</td>
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<tr>
<td>4</td>
<td>Viva voce</td>
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EQUIPMENTS REQUIRED:

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<th>Range</th>
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<tbody>
<tr>
<td>1</td>
<td>Desktops and Laptops</td>
<td>----</td>
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<tr>
<td>2</td>
<td>Laser Printer</td>
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<tr>
<td>3</td>
<td>Software (C Compiler and Editor)</td>
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</table>
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**

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<td>2</td>
<td>Execution</td>
<td>30</td>
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<tr>
<td>3</td>
<td>Result with Print out</td>
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<td>Viva voce</td>
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**EQUIPMENTS REQUIRED:**

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<th>Required Nos.</th>
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<tbody>
<tr>
<td>1</td>
<td>Computer with Pentium / Core processors with inbuilt NIC</td>
<td>12</td>
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<tr>
<td>2</td>
<td>Hard disk drive</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>CDD/ DVD Writer</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Hard disk drive</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Blank Blu-ray disk</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>Web camera</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Laser Printer</td>
<td>2</td>
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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**

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<tr>
<td>Project Work</td>
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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..


LIST OF QUESTIONS
A. ENVIRONMENTAL 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

**************
The polytechnic was granted Academic autonomy by the Government of Tamilnadu in 1993 in recognition of its quality of education. It was renamed as SANKAR POLYTECHNIC COLLEGE in 2002 based on Government norms. Our Polytechnic celebrated its Silver Jubilee in 1983 and Golden Jubilee in 2008-09. The polytechnic is situated in an area of 120 acres with a built-in area of about 12000 sq M having spacious classrooms, well-equipped laboratories, workshops and other amenities. Standard sports grounds are available for physical education. Separate well-maintained hostel facilities are available for bot