

**Course Name :** Diploma in Electronics Engineering  
**Course Code :** DEInE  
**Semester :** Sixth  
**Subject Title :** Digital Communication  
**Subject Code :** 133EX61

**Teaching and Examination Scheme:-**

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
3	-	3	3	80	32	20	100	40	50	20	-	-	25	10	175

**Rationale:-**

Digital communication systems are becoming increasingly attractive because of ever growing demand for data communication. Digital transmission offers data processing option and flexibility not available with analog transmission.

This is technology group subject, which will enable student to comprehend facts, concepts & working principle of digital communication system. This subject familiarizes the student with information theory, measurement of information rate & capacity. This subject helps the student to understand the concept of various pulse modulations, Digital modulation techniques, coding methods and error control, multiplexing & multiple access techniques and S.S. modulation. The knowledge acquired by student will help them to apply it in various modern communication systems.

**Objectives:-**

The students will be able to:

1. Compare analog communication system with digital communication system.
2. Define channel capacity and entropy.
3. Explain sampling theorem.
4. Study PAM, PWM, PCM.
6. Draw the block diagram of PCM, DM, ADM, and DPCM.
7. Draw block of PSK transmitter & receiver. Compare ASK, FSK, PSK.
8. Draw block diagram for QFSK, QAM DP
9. Describe the various types of coding methods & error detection and correction.
10. Explain need of multiplexing.
11. Explain concept of TDMA, FDMA, and CDMA.
12. Define PN sequence.
13. Explain spread spectrum modulation & frequency hop spread spectrum.

**Syllabus**

**Part I:- Theory**

Sr. No	Contents	L	M
<b>Section I</b>			
1	<b>Introduction of Digital Communication</b> 1.1 Basic digital communication system, block diagram 1.2 Channel capacity-definition, Hartley's law, Shannon-Hartley theorem, Channel capacity equation, channel noise and its	06	12

	effect, entropy 1.3 Advantages and disadvantages of digital Communication		
2	<b>Pulse Communication</b> 2.1 Introduction, comparison with Continuous Wave Modulation , advantages 2.2 Sampling theorem, Nyquist rate, aliasing, natural & flat top sampling. 2.3 PAM, PWM, PPM definition, generation, block diagram, waveform analysis, and their comparison. 2.4 Pulse code modulation- block diagram of PCM transmitter & receiver, sampling quantization, quantization error, companding, inter symbol interference 2.5 Delta modulation- block diagram of DM, slope overload, granular noise. 2.6 ADM, DPCM, block diagram and working.	13	20
3	<b>Coding methods and Error control</b> 4.1 Baud rate, Bit rate. 4.2 Line coding - unipolar, bipolar – NRZ, RZ, Manchester 4.3 Source coding, ASCII, EBCDIC and baudout code. 4.4 Channel coding, Error, Causes of error and its effects, error detection & correction using parity, Hamming code & simple numerical.	05	08
	<b>Section II</b>		
4	<b>Digital Modulation Techniques</b> 3.1 ASK, FSK, PSK definition & waveforms, their transmitter and receiver block diagram and working. 3.2 M-ary encoding. 3.3 QPSK, QAM, DPSK block diagram of transmitter and receiver and working. 3.4 Bandwidth for each modulation technique and their comparison	12	18
5	<b>Multiplexing and Multiple Access</b> 5.1 Need of Multiplexing, TDM, FDM definition block diagram and their comparison. 5.2 Introduction to WDM. 5.3 Access technique TDMA, FDMA, CDMA, advantages of TDMA over FDMA.	06	12
06	<b>Spread spectrum modulation</b> 6.1 Introduction, PN Sequence. 6.2 Model of spread spectrum modulation system. 6.3 Direct sequence spread spectrum signal. 6.4 Frequency hop spread spectrum, slow frequency hopping, and fast frequency hopping. 6.5 Application	06	10
	<b>Total</b>	<b>48</b>	<b>80</b>

## **Part II:- Practicals**

### **Intellectual Skills to be developed:**

1. Selection of appropriate sample
2. Selection of Equipment
3. Interpretation of waveforms
4. Setting up of equipment

### **List of Laboratory Experiments:-**

1. Observe waveforms of Pulse Amplitude modulation (using natural sampling & flat top sampling).
2. Observe waveforms of Pulse width modulation (using natural sampling & flat top sampling) .
3. Observe waveforms of Pulse Position modulation (using natural sampling.
4. Observe waveforms of Pulse code modulation and demodulation.
5. Observe waveforms of Delta modulation.
6. Observe waveforms of ASK modulation & demodulation.
7. Observe waveforms of FSK modulation & demodulation.
8. Observe waveforms of PSK modulation & demodulation.
9. Observe waveforms of QPSK modulation & demodulation.
10. Observe waveforms of QAM modulation & demodulation.
11. Any one of the following:
  1. Error detection & correction using parity bits.
  2. Error detection & correction using hamming codes
  3. To generate following different line codes and decode them.
    1. NRZ (Unipolar) 2. Bipolar NRZ 3. RZ (Unipolar) 4. Bipolar RZ
12. Any one of the following:
  1. Time division multiplexing/ de multiplexing system
  2. Frequency division multiplexing/ de multiplexing system

### **Learning Resources:-**

#### **Text Books: -**

1. Electronic Communication Systems Fundamental Through Advanced, 5<sup>th</sup> Edition, by Wayne Tomasi, Pearson Education.
2. Electronic Communications, 4<sup>th</sup> Edition by Roddy & Collen , Prentice Hall India Pvt. Ltd.
3. Communication Electronics, 4<sup>th</sup> Edition by Louis E. Frenzel, Tata McGraw-Hill.

#### **Reference Books:-**

1. Digital & Analog Communication Systems, 1<sup>st</sup> Edition by K Sam Shanmugam, Wiley India Pvt. Ltd.
2. Digital Communications: Fundamentals & Applications, 2<sup>nd</sup> Edition by B. Sklar & P. Ray, Pearson Education
3. Digital Communications, 1<sup>st</sup> Edition, by Simon Haykin, Wiley India Pvt. Ltd.
4. Data Communications & Networking, 4<sup>th</sup> Edition by B. A. Forouzan, Tata McGraw -Hill

**Course Name :** Diploma in Electronic Engineering  
**Course Code :** DELnE  
**Semester :** Sixth  
**Subject Title :** Microcontroller  
**Subject Code :** 133EX62

**Teaching and Examination Scheme:–**

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	3	80	32	20	100	40	25	10	-	-	25	10	150

**Rationale:–**

This subject covered Microcontroller MCS- 51 family architecture, details of 8051 Microcontroller and its programming. The prerequisite of this subject is the thorough knowledge of architecture of 8085 Microprocessor and its programming. The peripheral devices of 8085 microprocessor such as 8253, 8259, 8237 are covered in this subject. The knowledge of interfacing of peripherals will help the students in acquiring the design skill for various applications. The Technology of microprocessor has led to a single chip Microcontroller will make the students equipped for the development of embedded systems.

**Objectives:–**

- The student will be able to:
- Draw block diagram for architecture of 8051.
- Write syntax of given instructions.
- Write the Assembly Language Program for given problem statements
- Design and develop microcontroller based systems

**Learning Structure:-**

**Syllabus**

**Part I: - Theory**

Sr. No	Contents	L	M
<b>Section I</b>			
1	<b>Programmable Interface Devices</b> Block diagram, function of each block and interfacing following peripheral chips with the 8085 Microprocessor. 8253 - Programmable interval timer, 8259 - Programmable interrupt controller, 8237 - DMA controller, Interface 8051 Microcontroller with the external Program and Data memory.	12	20
2	<b>Introduction to Microcontroller</b> 2.1 Comparison of Microprocessor, Microcontroller and		

	<p>Microcomputer.</p> <p>2.2 Terminology: - RISC, CISC, VLIW, Harvard and Von Neumann Architectures</p> <p>2.3 Commercial Microcontroller devices and families.</p> <p>2.4 MCS-51 Architecture and details (8051 Microcontroller)</p> <p>2.5 Pin configuration</p> <p>2.6 8051 Hardware details :- Clock, Oscillator, Registers, SFRs, DPTR, Flags, Stack, PC, Port structure and operations.</p> <p>2.7 Power saving options</p> <p>2.8 Memory Organization :- Program memory, Data memory, External memory.</p> <p>2.9 External memory interfacing with 8051 microcontroller.</p>	12	20
<b>Section II</b>			
3	<p><b>MCS-51 Programming Techniques</b></p> <p>3.1 8051 Addressing modes</p> <p>3.2 MCS-51 Instruction Set</p> <p>3.3 CPU timing :- Machine cycles</p> <p>3.4 Programming examples</p>	10	15
4	<p><b>MCS-51 Timers/Counters, Interrupts and Serial Interface</b></p> <p>4.1 Study of Timers/Counters :- Timer modes of operations, programming of 8051 timers, SFRs of timer TMOD and TCON in detail.</p> <p>4.2 Study of Interrupts :- Priority level structure, IE and IP SFRs, external interrupt, Response time.</p> <p>4.3 Study of Serial Interface :- SCON, SBUF, PCON SFRs, Multiprocessor communications, Baud Rates and generating baud rates, Serial port in Different Modes.</p>	12	20
5	<p><b>Advanced Microcontroller</b></p> <p>AVR Microcontroller: - AVR processor architecture, Hardware features – Packaging, system clock, timers, parallel input/output, serial I/O, analog input/output, Configuration, EEPROM data memory.</p>	02	05
<b>Total</b>		<b>48</b>	<b>80</b>

## **Part II:- Practicals**

**Skills to be developed –**

### **Intellectual skills–**

Ability to understand how the Microcontroller logically works.

To be able to apply different logics to solve given problem.

To be able to write program using different logic for the same problem

**Motor skills –**

To load the program in microprocessor/Microcontroller kit, observe the result.

**List of Laboratory Experiments:-**

Write an Assembly Language Program to

- 1) Add / Sub two 8 bit numbers.
- 2) Add/ Sub of two Multibyte numbers. e.g. Two 3 Byte Numbers.
- 3) Find sum of series of 8 bit numbers.
- 4) Multiply two 8 bit numbers.
- 5) Divide two 8 bit numbers.
- 6) Add / Sub two BCD numbers.
- 7) Find No. of 0's and 1's from 8 bit Binary number.
- 8) Transfer block of data from Source memory location to Destination memory location.
- 9) Find smallest/ largest number from array of n numbers.
- 10) Arrange numbers in array in ascending/ descending order.
- 11) Find one's and two's complement of a given number.
- 12) Exchange the lower & upper nibble of a byte.
- 13) Sort odd and even byte from given 10 bytes.

**Learning Resources:-****Text Books: -**

- 1) The 8051 Microcontroller, Architecture Programming and Application, 2<sup>nd</sup> Edition by Kenneth J Ayala, Penram International Publishers (India).
- 2) Programming & Customizing 8051 Microcontrollers, 1<sup>st</sup> Edition by M Predko, Tata McGraw-Hill.

**Reference Books:-**

- 1) Microcontrollers: Theory & Applications, 1<sup>st</sup> Edition by Ajay Deshmukh Tata McGraw-Hill.
- 2) Advanced Microprocessors and Microprocessors, 1<sup>st</sup> Edition by S K Venkata Ram, Laxmi Publications.

**Course Name :** Diploma in Electronic Engineering  
**Course Code :** DEInE  
**Semester :** Sixth  
**Subject Title :** Data Communication & Networking  
**Subject Code :** 133EX63

**Teaching and Examination Scheme:–**

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	3	80	32	20	100	40	-	-	25	10	25	10	150

**Rationale:–**

After understanding basic communication system it is worth to discuss Data Communication & Networking. Telecommunication & Data communication is fastest growing technology & undoubtedly has strong growth in future so we should know data transfer from one system to another system through different communication networks like WAN, MAN & different switching techniques.

**Objectives:–**

The student will be able to:

1. Distinguish between different terms used for digital data communication
2. Describe the working of different switching techniques.
3. Identify the error & suggest corrective techniques.
4. Describe Wireless LAN Technology.
5. Define different active hub, router, gateway kind of devices.
6. Compare different distributed application system.

**Learning Structure:-**

**Syllabus**

Section I			
Sr. No	Contents	L	M
1	<b>Concept of Data Communication &amp; Networking.</b> 1.1 What is Data Communication? Components of communication. 1.2 Network, Network criteria. Categories of networks (LAN, MAN, WAN). 1.3 Physical structure and Topology. 1.4 Protocols and Standards. 1.5 The OSI Model , Layered Architecture, Peer-to-Peer Process, Interfaces between layers, encapsulation, layers structure , TCP/IP protocol suite, difference between TCP/IP and OSI model. Brief introduction of bit length, bit rate, Propagation delay, Bandwidth Delay product.	06	10
2	<b>Switching.</b> 2.1 Introduction.	06	10

	2.2 Circuit-Switched Networks. 2.3 Datagram Network. 2.4 Virtual-Circuit Networks.		
3	<b>Connecting LANs, Backbone Networks, and Virtual LANs</b> 3.1 Connecting devices 3.1.1 passive Hubs (Repeaters) 3.1.2 Active Hub (Bridges) 3.2 Two layer Switches. 3.3 three layer switches.	06	10
4	<b>Flow Control and Errors Control.</b> 4.1 Line discipline. 4.1.1 ENQ/ACK. 4.1.2 POLL/Select. 4.2 Flow Control. 4.2.1 Stop-and-wait. 4.2.2 Sliding Window 4.3 Error Detection redundancies. 4.3.1 VRC 4.3.2 LRC 4.3.3 CRC 4.4 Error Control ARQ, Error types single bit error burst error 4.4.1 Stop-and-wait ARQ 4.4.2 Go-back-n ARQ 4.4.3 Selective reject ARQ.	06	10
<b>Section II</b>			
5	<b>Multiple Access control</b> 5.1 Random Access 5.1.1 Pure Aloha 5.1.2 Slotted Aloha 5.2 Carrier sense multiple access 5.2.1 CSMA/CD 5.2.2 CSMA/CA 5.3 Reservation Access 5.3.1 Polling 5.3.2 Token Passing.	09	15
6	<b>Wireless LAN</b> 6.1 IEEE 802.11 - Architecture- BSS, ESS; MAC layer – DCF, PCF 6.2 Bluetooth – Architecture; Bluetooth layers – Media layer, base band layer, physical links, L2 CAP.	09	15
7	<b>Introduction to Distributed Application Layer Protocols</b> 7.1 Application - Simple Network Management Protocol (SNMP); Simple Mail Transfer Protocol (SMTP); 7.2 Multipurpose Internet Mail Extension (MIME); Hyper Text Transfer Protocol (HTTP); File Transfer Protocol (FTP) Uniform Resource Locator (URL)	06	10
<b>Total</b>		<b>48</b>	<b>80</b>

### Practical List

1. LRC implementation
2. VRC implementation
3. CRC implementation
4. Framing and segmentation (any example)
5. Study of protocols with the help of college laboratory (eg ftp, http in college internet)
6. Serial Communication with serial port between 2 PCs
7. Study of wireless LAN, example: Bluetooth in mobiles

### **Learning Resources:-**

Industrial visit for different companies related with data transfer, web designing like L&T infotech, Infosys, TCS etc.

### **Recommended Books:-**



**Text Book: -**

Data Communications & Networking, 4<sup>th</sup> Edition by B. A. Forouzan,(2<sup>nd</sup> edition) Tata McGraw –Hill.

**Reference Books:-**

- 1) Introduction to Data & Network Communications, 1<sup>st</sup> Edition  
by Michael A Miller, Thomson Delmar Learning.
- 2) Data and Computer Communications, 8<sup>th</sup> Edition by William Stallings,  
Pearson Publisher.

**Course Name :** Diploma in Electronic Engineering  
**Course Code :** DEInE  
**Semester :** Sixth  
**Subject Title :** Advanced Communication  
**Subject Code :** 133EX64E1

**Teaching and Examination Scheme:–**

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
3	-	3	3	80	32	20	100	40			25	10	25	10	150

**Rationale:–**

After understanding basic communication system it is worth to discuss Advanced Communication. Microwave, satellite, radar all these latest are fastest growing technology & undoubtedly has strong growth in future so we should know how exactly signal transmission is possible via different media. Even with space wave how this amazing world of signal is acting. With light wave in optical fiber how signal gets propagated.

**Objectives:–**

The student will be able to:

1. Distinguish between different terms used for Advanced Communication
2. Describe the working of different transmission line and wave guide.
3. Identify the different types of antenna at gigahertz frequency megahertz frequency.
4. Describe satellite communication.
5. Describe fiber optic communication techniques.
6. Describe Radar communication.

**Learning Structure:-**

**Syllabus**

Section I			
Sr. No	Contents	L	M
1	<b>Microwave Techniques</b> 1.1 Microwave perspectives, bandwidth benefits 1.1.1 Challenges of microwave and application of microwave. 1.2 Stripline, microstripline. 1.2.1 Waveguides, Energy coupling, operating frequency range. 1.2.2 Rectangular wave guide, parallel plane waveguide, circular wave guide. 1.3 Modes of operation, TE, TM, TEM modes detail description. 1.4 Coupling hardware 1.4.1 different types of cavity resonators.	06	15
2	<b>Microwave semiconductor devices.</b> 2.1 Point contact diode. 2.2 Hot carrier diode. 2.3 Varactor diode.	07	07

	2.4 Step recovery diode. 2.5 Gunn diode. 2.6 Impatt and Trapatt diode 2.7 tunnel diode. 2.8 Microwave tubes. 2.8.1 Klystron and reflex klystron 2.8.2 Magnetron. 2.8.3 Travelling wave tube.		
3	<b>Microwave Antennas.</b> 3.1 Horn antenna. 3.2 Parabolic antenna 3.3 Helical antenna 3.4 Miscellaneous antennas overview like becone, slot, patch, Lens etc (Simple Numerical)	05	10
4	<b>Radar Systems</b> 4.1 Basic Principles of Radar. 4.2 Basic Pulsed Radar system. 4.2.1 Block diagram and description. 4.3 Basic continuous wave Radar. 4.4 MTI system 4.4.1 Block diagram of fundamental MTI radar system with power amplifier output.	06	08
<b>Section II</b>			
5	<b>Satellite Communication</b> 5.1 Satellite orbit fundamentals.5.1.1 Orbit shape 5.1.2 Satellite speed and period, satellite angles, satellite repeaters. 5.2 LEO,MEO,GEO satellite overview 5.3 Station keeping, attitude control, satellite positioning 5.4 Satellite lurching. 5.5 Satellite communication system.5.5.1 Transponders 5.5.2 Satellite frequency allocation and frequency reuse. 5.6 Satellite subsystems.5.6.1 Communication subsystem 5.6.2 Power subsystem 5.6.3 Telemetry, Tracking and Control Subsystem 5.6.4 Attitude Control subsystem 5.7 Application overview.	08	15
6	<b>Fiber Optic Communication</b> 6.1 Light Wave Spectrum 6.2 History of Fiber Optic. 6.3 Advantage & disadvantages of Fiber optic communication. 6.4 Application of FOC in Industrial, Defense, Commercial Field. 6.5 Block Diagram of Fiber Optic Communication.	08	10
7	<b>Fiber Optic Communication &amp; Ray Theory</b> 7.1 Construction or Preparation of Fiber Optic Cable.7.1.1 Liquid phase technique.7.1.2 Fiber drawing. 7.1.3 Vapour-phase deposition.7.1.4 Outside vapour-phase deposition oxidation.7.1.5Vapour axial deposition 7.1.6 Modified chemical vapour deposition 7.1.6 Plasma activated chemical vapour deposition. 7.2 Fiber Characteristics & Classification. 7.3 Source & It's Limitations,7.3.1 Construction & working Principle of LED, 7.3.2 Construction & working Principle of LASER. 7.4 Detector, Limitation, Construction & working principle, Photo Diode.7.4.1 Optical Transmitter Receiver circuit 7.5 Splicing Techniques.7.5.1 Optical connectors. 7.6 Definition & Concept of Reflection, dispersion, diffraction,	08	15

	absorption & scattering with the help of light theory 7.7 Definition of Snell's Law, Numerical Aperture\ Acceptance angle, acceptance cone, Critical Angle( Simple Numerical)		
	<b>Total</b>	<b>48</b>	<b>80</b>

**Practical list**

1. Analog fiber optic system
2. Digital fiber optic system
3. Measurement of numerical aperture
4. Measurement of attenuation
5. Light source characteristics
6. Practical based on Antenna trainer.
7. VSWR measurement using microwave test bench.
8. Introduction to microwave components.

**Learning Resources:**

Industrial visit for different companies related with Microwave components manufacturer, Fiber optic cable manufacturer, Radar application based.

**Recommended Books:**

**Text Books:**

1. Communication Electronics- Frenzel- TATA Mc-Graw-Hill- Third Edition.
2. Optical Fiber Communication - Gred Keiser Mc- Graw Hill Publication

**Reference Books:**

1. Optical Fiber Communication - John Senior Prentice Hall of India Publication
2. Electronic Communication System – Kennedy Davis-Tata McGraw-Hill.

**Course Name :** Diploma in Electronic Engineering  
**Course Code :** DEInE  
**Semester :** Sixth  
**Subject Title :** Embedded System  
**Subject Code :** 133EX64E2

**Teaching and Examination Scheme:–**

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	3	80	32	20	100	40	-	-	25	10	25	10	150

**Rationale:–**

Computers have always been embedded into all sorts of everyday items. These are the “Embedded computers or embedded systems” They account for a majority of the world’s manufactured processors and are further gaining importance as an increasing number of systems use embedded processors, RAM, disk drives, and networks. With their wide range of applications, study of embedded systems is highly essential. The subject here deals with computer hardware with software embedded in it. It is practical oriented subject having theoretical prerequisites of Microprocessor, Digital Techniques, Data Structures and Computer Architecture.

**Objectives:–**

1. To introduce students to embedded systems
2. To introduce and enable students to access embedded systems hardware units
3. To teach interfacing various devices using ports.
4. To teach how to write embedded programs.
5. To explain real time operating systems, inter task communication.

**Syllabus**

**Part I:- Theory**

Sr. No	Contents	L	M
	<b>Section I</b>		
1	<b>Embedded basic system</b> 1.1 Computer architecture 1.2 Choosing a Microcontroller 1.3 Overview of 8051 family. 1.4 Architecture 1.5 Memory organization 1.6 Functional pin, Ports & circuit. 1.7 Addressing mode, Instruction Set	06	10
2	<b>Interfacing Methods &amp; Interrupts Servicing Mechanism</b> 1.1 What is interfacing? Performance measure. Verities of I/O ports 1.2 Blind cycle counting interface 1.3 Gadfly or busy wait interface 1.4 Parallel I/O interface	06	10

	1.5 Interrupt 1.6 Types of Interrupts Servicing Mechanism 1.6.1 FIFO 1.6.2 Fixed priority 1.6.3 Round-Robin Polling 1.6.4 Periodic polling		
3	<b>Serial Communication &amp; Parallel communication</b> 3.1 Serial Communication – RS-232, I2C, CAN 3.2 Parallel Communication – ISA,PCI,PCI-X 3.3.Advanced I/O buses 3.4 Study of RS-232 Pin out	06	10
4	<b>Memory organization</b> 4.1 Structural units in processor and processor selection 4.3 Memory devices & memory selection 4.4 Memory Allocation 4.5 DMA 4.6 Memories & I/O devices	06	10
<b>Section II</b>			
5	<b>Device Driver &amp; Threads</b> 5.1 Device Drivers 5.2 Parallel port device driver 5.3 Serial port device driver 5.4 Context switching 5.5 Threads 5.5.1 Single Threaded Execution 5.5.2 Multithreading 5.5.3 Semaphores	06	10
6	<b>Interprocess Communication</b> 6.1 Multiple processes in an Application 6.2 Problem of sharing data by Multiple task and routines 6.3 Interprocess communication 6.4 Serial Communication Interface 6.5 Synchronous transmission & receiving Using SPI	06	10
7	<b>RTOS</b> 7.1 Real Time and Embedded systems OS 7.2 Requirement, Need, Specification of RTOS in Embedded systems 7.3 Interrupt routines in RTOS 7.4 RTOS task scheduling models 7.5 Mutual Exclusion, Starvation, Deadlock	12	20
<b>Total</b>		<b>48</b>	<b>80</b>

## **Part II:- Practicals**

**Skills to be developed –**

### **Intellectual skills–**

The following skills of practical implementation will be developed: Problem definition  
Analysis Design of logic: Using different implementations for the same program Coding: Use of programming language constructs in program implementation

Testing and debugging: Studying different types of errors like syntax semantic, fatal, linker & logical Maintenance (Modifications, error corrections, making changes etc.)

### **List of Laboratory Experiments:-**

Some experiments shall be performed on 8051 kit & remaining can be performed using PC & kit either using Assembler or “C” programming language or Keil Software.

1. Write a Program on Block Move.
2. Assume 1 Hz. Frequency pulse is connected to I/P P3.4 Write a Program to display count on LCD kit.
3. Write a Program to find the frequency of square wave generated on pin P1.0.
4. Write a Program to generate a square wave of 50 Hz. Frequency on pin P1.2 using interrupt for timer.
5. Write a Program to connect INT 1 pin to a switch that is normally high whenever it goes low LED should turn ON which is connected to P1.3 & LED is normally OFF. LED should be ON as long as switch is pressed.
6. Write a Program to transfer message “Yes” serially at 9600 baud rate 8-bit, data, 1 stop-bit & do this continuously.
7. Write a Program for Interfacing ADC & DAC.
8. Write a Program to Interface keyboard.
9. Write a Program to Interface LCD.
10. Write a Program to Interface stepper motor.

### **Mini project:**

A project which applies the embedded systems knowledge earned through this course should be implemented. Students can select a topic of their own which may buildup on the laboratory experiments.

### **Learning Resources:-**

#### **Text Book: -**

Embedded Systems: Architecture, Programming and Design, 2<sup>nd</sup> Edition,  
by Raj Kamal, Tata McGraw- Hill

#### **Reference Books:-**

- 1) An Embedded Software Primer by David E. Simon, Pearson Education
- 2) The 8051 Microcontroller and Embedded Systems, 2<sup>nd</sup> Edition by M Mazidi, Pearson Education
- 3) The 8051 Microcontroller: Hardware, Software and Interfacing, 2<sup>nd</sup> Edition by J W Stewart and K X Miao, Prentice Hall.
- 4) Programming & Customizing 8051 Microcontrollers, 1<sup>st</sup> Edition by M Predko, Tata McGraw-Hill.
- 5) Embedded System Design: A unified Hardware/Software Introduction, by Frank Vahid, Toney Givargis, John Wiley Publishers.
- 6) Embedded C Programming and the Atmel AVR, 2<sup>nd</sup> Edition by Barnett, Cox, O’Cull, Delmar Cengage Learning
- 7) Programming Embedded Systems in C and C++, 1<sup>st</sup> Edition by Michael Barr & Andy Oram, O’Reilly and Associates Publisher.
- 8) Embedded Systems, Jonathan W. Valvano

**Websites:-**

EE Times: [embedded.com](http://embedded.com)  
[embeddedstar.com](http://embeddedstar.com)  
[embeddeddeveloper.com](http://embeddeddeveloper.com)  
[microcontroller.com](http://microcontroller.com)



**Course Name :** Diploma in Electronic Engineering  
**Course Code :** DEInE  
**Semester :** Sixth  
**Subject Title :** Mobile Communication  
**Subject Code :** 133EX64E3

**Teaching and Examination Scheme:–**

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	3	80	32	20	100	40	-	-	25	10	25	10	150

**Rationale:**

The glorious 21st century marks the mobile radio communication industry by orders of magnitude. The recent exponential growth in cellular mobile communication needs more skilled technicians for operation, maintenance & servicing of mobile cellular system. This subject is classified under technology group and it is based on communication theory, which gives theoretical as well as practical knowledge of different cellular system. It covers digital cellular mobile system. It covers digital cellular mobile system such as GSM, IS – 95 standards, WLL, call processing & basic of mobile communication system.

**Objectives:**

The student should able to:

1. Compare operation of different mobile communication system
2. Describe cellular concept such as frequency reuse, hand off
3. Describe coverage & capacity in cellular system
4. Draw GSM system architecture
5. Explain call processing in GSM
6. Explain CDMA (IS-95) standards
7. Explain Call processing in CDMA
8. Compare GSM & CDMA
9. Define SS7 services
10. Demonstrate GSM system & CDMA system

**Learning Structure:-**

**Syllabus**

Section I			
Sr. No	Contents	L	M
1	<b>Introduction to wireless communication system</b> 1.1 Evolution of mobile radio communication 1.2 Mobile radio system around the world. (Such as AMPS, N- AMPS, IS-95, GSM) 1.3 Related definition base station, control channel, forward channel etc. Examples of wireless communication system such as paging system, cordless telephone system, cellular telephone system , how cellular telephone call is	06	10

2	<b>Mobile unit And radio propagation</b> 2.1 Block Diagram and operation of mobile unit 2.2 Block Diagram & Explanation frequency synthesizer 2.3 Block diagram and operation of transmitter, receiver, logic unit, control unit & handset 2.4 Reflection, ground reflection model (2 ray model), diffraction, practical link budget design using path loss models. 2.5 Small scale fading and multi-path. Small-scale multipath propagation, parameter of multi-path channels, types of small scale fading,	09	15
3	<b>Multiple access Technique in Wireless Communications</b> 3.1 Frequency Division Multiple access. 3.2 Time Division Multiple access. 3.3 Spread Spectrum Multiple access. 3.4 Space Division Multiple access.	09	15
<b>Section II</b>			
4	<b>The cellular concept.</b> 4.1 Introduction to cellular concept.4.1.1 Introduction to basic cellular system.4.1.2 Frequency reuse.4.1.3 Hand off, Type of hand off, hard hand off, soft hand off, delayed and queued hand off. 4.2 Interference & system capacity.4.2.1 Co channel interference & system capacity.4.2.2 Channel planning for wireless system. 4.2.3 Adjacent channel Interference.4.2.4 Power control for reducing interference(Closed loop, Open loop) 4.3 Improving coverage and capacity in cellular system.4.3.1 Cell splitting.4.3.2 Sectoring.4.3.3 Repeater for range extension.4.3.4 Micro cell zone concept	09	15
5	<b>Digital cellular mobile systems.</b> 5.1 G.S.M system architecture.5.1.1 G.S.M services & features. 5.2 G.S.M radio subsystems.5.2.1 G.S.M channel types. 5.3 Message & call processing in GSM 5.4 Privacy & security in GSM.	09	15
6	<b>CDMA digital cellular standard (IS-95):</b> 6.1 Signal system no.7 (ss7)—performance services. 6.2 CDMA digital cellular standard IS-95. 6.3 IS.95 frequency & channel specification. 6.4 forward and reverse CDMA channel, packet and frame formats,	06	10
<b>Total</b>		<b>48</b>	<b>80</b>

**Practical List:-**

**(Any Ten)**

1. Perform installation of mobile phone.
- 2 Observe Input / Output signal of different sections
- 3 Read the content of SIM card.
- 4 To understand & perform charging of handset.

- 5 Perform testing procedure.
6. Testing of mobile handset.
7. Find out different add- on accessories for cell phones (battery, charger, hands free data cable)
8. Identify different sections & component of mobile unit such as (Ringer section, dialer section, receiver section etc.
9. Demonstration of handoff, frequency response, cell splitting.
10. Prepare report on different facilities provided by cellular company (visit)
11. Prepare report on cellophane operator companies and their plan & traffic. (Visit)
12. Find out the specifications of different handsets provides by different companies.
13. Power supply requirement, battery technology, display, phone memory, answered called memory charging time, Facilities: - STD, ISD & LIP)
14. Prepare report on GSM technology, its network, GSM capability & data Services.
15. Study & prepare report on cell site , distance coverage , antennas used & other components.

**Learning Resources:-**

Industrial visit for different companies related with GSM mobile company, CDMA mobile station, like TATA Indicom, Reliance, Airtel, BPL etc.

**Recommended Books:-**

**Text Book: -**

- 1) Wireless Communication Principles & Practice- Pearson Education- T.S.Rappaport.
- 2) Mobile & Personal communication services& system - Prentice Hall - Raj Pandya

**Reference Books:-**

- 1) Mobile Cellular Telecommunication - Tata McGraw Hill - William Lee
- 2) Mobile Computing - Tata McGraw Hill - Asoke Talukder, Roopa Yavagal

**Course Name :** Diploma in Electronics Engineering  
**Course Code :** DEInE  
**Semester :** Sixth  
**Subject Title :** Management Principles  
**Subject Code :** 133EX65

**Teaching and Examination Scheme:–**

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
2	-	-	-	-	-	-	-	-	-	-	-	-	25	10	25

**Rationale:**

Students of diploma courses on completion of the course join industry in supervisory positions, where they are responsible for decision making, leading, motivating and controlling the subordinates. This subject aims at exposing them to theory and practice related to these through lectures, seminars and case studies.

**Objectives:**

The students will able to:

1. Familiarize environment in the world of work
2. Explain the importance of management process in Business.
3. Identify various components of management.
4. Describe Role & Responsibilities of a Technician in an Organizational Structure.
5. Apply various rules and regulations concerned with Business & Social responsibilities of the Technician.

**Syllabus**

**Part I:- Theory**

Sr. No	Contents	L
1	Management: Definition, functions, levels, skills.	2
2	Planning: Process, merits, limitations.	4
3	Decision making: Decision making models, group decision making.	4
4	Organizing: Span of management, delegation of authority, decentralization of authority, departmentation.	8
5	Communication: Upward, downward, formal and informal communication. Barriers to effective communication and ways to overcome them.	4
6	Motivation: Maslow's and Herzberg's theories. Incentives.	4
7	Leadership: Autocratic and democratic styles, Situational leadership. Leadership continuum and managerial grid.	4
8	Controlling: Controlling process. Requirements of a good control system.	2
<b>Total</b>		<b>32</b>

**Assignments:**

- a) Six groups and individual Assignments
- b) Three to four case studies,
- c) One seminar
- d) One role plays/group discussion on the above topics.

**Learning Resources:****Text Book:**

Industrial and Business Management, 2007 Edition, by Telsang M.T.,  
S Chand Publishers.

**Reference Books:**

- 1) Essentials for Management: An International Perspective, 8<sup>th</sup> Edition, By Koontz , Mhe  
Publisher.
- 2) Industrial Organisation and Management, 3<sup>rd</sup> Edition by Dr P N Reddy, Prof H R  
Appannaiah, Prof V Surendar, Himalaya Publishers.

**Course Name :** Diploma in Electronics Engineering  
**Course Code :** DEInE  
**Semester :** Sixth  
**Subject Title :** Project  
**Subject Code :** 133EX66

**Teaching and Examination Scheme:-**

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
-	-	4	-	-	-	-	-	-	-	50	20	50	20	100	

**Rationale:-**

Diploma holders need to be capable of doing self study throughout their life as the technology is developing with fast rate. Student will be able to find out various sources of technical information and develop self-study techniques to prepare a project and write a project report.

This subject is intended to teach students to understand facts, concepts and techniques of electrical equipments, its repairs, fault finding and testing, estimation of cost and procurement of material, fabrication and manufacturing of various items used in electrical field. This will help the students to acquire skills and attitudes so as to discharge the function of supervisor in industry and can start his own small-scale enterprise.

**Objectives:-**

The students will be able to:

1. Work in Groups, Plan the work, and Coordinate the work.
2. Develop leadership qualities.
3. Analyze the different types of Case Studies.
4. Develop innovative ideas.
5. Develop basic technical skills by hands on experience.
6. Write project report.
7. Develop skills to use latest technology in Electrical field.

**Course Contents:**

Following activities related to project are required to be dealt with, during this semester

1. Form project batches & allot project guide to each batch. (Five students per batch)
2. Each project batch should select topic / problem / work by consulting the guide Topic / Problem / Work should be approved by Head of Department.
3. Each project batch should prepare action plan of project activities & submit the same to respective guide.
4. At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project.
5. Action Plan should be part of the project report.

**NOTE:**

**The students may select different project for Semester VI.**

**OR**

**This project may be the continuation (2nd Part) of Semester V**

**Learning Resources:**

Books/ Magazines:

1. IEEE Transactions/Journals
2. Electrical India
3. IEEMA Journal
4. Elecrama
5. Technorama
6. Urja
7. Industrial Automation
8. Electronics for You
9. Electronics Projects
10. Computer World
11. Chip
12. Computer Active
13. Any Journal Related to Electrical Engg./Electronics/Computer/Information Technology.

**Course Name : Diploma in Electronics Engineering**  
**Course Code : DEInE**  
**Semester : Sixth**  
**Subject Title : Student Centered Activity/Test**

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		P		O		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-

**Rationale:–**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Expert lectures, E-learning sources, E-library, Internet, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

**Objectives:**

The Student will be able to:

1. Acquire information from different sources
2. Prepare notes for given topic
3. Present given topic in a seminar
4. Interact with peers to share thoughts
5. Take the advantages of E-learning sources