VeermataJijabai Technological Institute (V.J.T.I)
(Central Technological Institute, Maharashtra State, INDIA)
H. R. Mahajani Marg, Matunga, Mumbai 400019
Tel.No. +912224198101-02 Fax: +91 2224102874
Website: www.vjti.ac.in

Programme: Diploma in ElectronicsEngineering(DElnE) Semester:VI Implemented from:2017

| COURSE CODE | COURSE | GR | TEACHING SCHEME (HRS/WK) | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CR | PAPER HRS | TH Max | TH Min | IST | TOTAL Max | TOTAL Min | PR Max | PR Min | OR Max | OR Min | TW Max | TW Min | TOTAL MARKS |
| 173EX61 | Industrial Electronics | C | 3 | - | 3 | 6 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25** | 10 | 25@ | 10 | 150 |
| 173EX62 | Advance Communication System | C | 3 | - | 2 | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25** | 10 | 25@ | 10 | 150 |
| 173EX63 | Embedded System | C | 3 | - | 3 | 6 | 3 | 80 | 32 | 20 | 100 | 40 | 25** | 10 | - | - | 25@ | 10 | 150 |
| ## | **Elective (any one)** | A | 3 | - | 2 | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25** | 10 | 25@ | 10 | 150 |
| 173EX65 | Management Principles | M | 3 | 2 | - | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | - | - | 25@ | 10 | 125 |
| 173EX66 | Institute Industry Interaction | A | 2 | - | - | 2 | - | - | - | - | - | - | - | - | - | - | 25@ | 10 | 25 |
| 173EX67 | Project II | A | - | - | 6 | 6 | - | - | - | - | - | - | - | - | 50** | 20 | 100@ | 40 | 150 |
| | TOTAL | | 16 | 2 | 16 | 35 | | 320 | | 80 | 400 | | 25 | | 125 | | 250 | | 900 |

Abbreviations: B – Basic; C – Core; A – Applied; M – Management; L – Theory Lecture; T – Tutorial; P – Practical; TH – Theory Paper; IST – In-Semester Tests (02); PR – Practical Exam; OR – Oral Exam; TW- Term Work.

* assessment by Internal Examiner ** assessment by External Examiner @ : TW assessment by Internal Examiner $ : Project Report ##list of electives for Semester V and VI

Curriculum Coordinator

VERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA, MUMBAI-19.

Head
Diploma in Electronics Engg

Dean -Diploma

VeermataJijabai Technological Institute (V.J.T.I)
(Central Technological Institute, Maharashtra State, INDIA)
H. R. Mahajani Marg, Matunga, Mumbai 400019
Tel.No. +912224198101-02 Fax: +91 2224102874
Website: www.vjti.ac.in

Programme: Diploma in Electronics Engineering(DElnE) Implemented from:2017

## ## List of Elective Subjects for Semester V and VI

| Sr. No. | Course code | Course Name |
|---|---|---|
| 1 | 173EX56E1 | PLC /SCADA |
| 2 | 173EX56E2 | Smart Grid Communication |
| 3 | 173EX56fE3 | Biomedical Instrumentation |
| 4 | 173EX56E4 | Very Large Scale Integration(VLSI) |
| 5 | 173EX56E5 | Internet of Things(IoT) |
| 6 | 173EX64E1 | Mobile Communication |
| 7 | 173EX64E2 | Electronics Circuit Design |
| 8 | 173EX64E3 | Signals and Systems |
| 9 | 173EX64E4 | Image processing and Neural networks |
| 10 | 173EX64E5 | Software Skill |

Curriculum Coordinator

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA, MUMBAI-19.

Head
Diploma in Electronics Engg.

Dean -Diploma

| | |
|---|---|
| DIPLOMA PROGRAMME | :DIPLOMA IN ELECTRONICS ENGINEERING |
| PROGRAMME CODE | :DElnE |
| SEMESTER | :SIXTH |
| COURSE TITLE | :INDUSTRIAL ELECTRONICS |
| COURSE CODE | :173EX61 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 3 | - | 3 | 6 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25 | 10 | 25 | 10 | 150 |

**Course Objectives:**

1. Understand various power conversion ( AC to DC, DC to AC, DC to DC ) techniques.
2. Understand the various methods of speed control and braking operation of motor drives.
3. Use of various power electronic devices in miscellaneous industrial applications.

**Course Outcomes:**

Student should be able to

| | |
|---|---|
| CO1 | Use the power electronic device in fixed ac to variable dc power conversion. |
| CO2 | Use the power electronic device in fixed dc to ac power conversion. |
| CO3 | Use the power electronic device in ac power conversion from one to other frequency. |
| CO4 | Use the power electronic device in fixed dc to variable dc power conversion. |
| CO5 | Use power electronic device in speed control, braking & other industrial applications. |

Course Content:

| SECTION-I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 1 | | **Phase Controlled Rectifiers ( Converters ) :** | 07 | 11 | CO1 | 35 % | 35% | 30% |
| | 1.1 | Single phase half & full wave converters, with R, RL, RL load and free wheeling diode Three phase half & full wave converters, with R, RL load and free wheeling diode | | | | | | |
| | 1.2 | Applications of converter | | | | | | |
| 2 | | **Inverters :** | 07 | 11 | CO2 | 35% | 35% | 30% |
| | 2.1 | Introduction and Classification of Inverters | | | | | | |
| | 2.2 | Single Phase Half Bridge and Full Bridge Inverters with R and RL load | | | | | | |
| | 2.3 | Single Phase Basic Series Inverter. Disadvantages of basic series inverter | | | | | | |
| | 2.4 | Single Phase Parallel Inverter | | | | | | |
| | 2.5 | Sinusoidal Pulse Width Modulated Inverter | | | | | | |
| | 2.6 | Requirements of a good inverter | | | | | | |
| | 2.7 | Applications of Inverter | | | | | | |
| 3 | | **Cycloconverter :** | 04 | 07 | CO3 | 35% | 35% | 30% |
| | 3.1 | Single phase step up cycloconverter | | | | | | |
| | 3.2 | Single phase step down cycloconverter | | | | | | |
| | 3.3 | Applications of cycloconverter | | | | | | |
| 4 | | **Choppers :** | 06 | 11 | CO4 | 35% | 35% | 30% |
| | 4.1 | Classification and Control strategies | | | | | | |
| | 4.2 | Principle of step down chopper with | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | waveforms | | | | | | |
| | 4.3 | Step up chopper working with waveforms | | | | | | |
| | 4.4 | Types of chopper:<br>A, B C, D & E ( Four Quadrant Chopper ) | | | | | | |
| | 4.5 | Voltage and Current commutated choppers | | | | | | |
| | 4.6 | Application of choppers | | | | | | |
| | | **SECTION II** | | | | | | |
| 5 | | **Dynamics of Electric Drive :** | 04 | 07 | CO5 | 30% | 40% | 30% |
| | 5.1 | Active and Passive types of load | | | | | | |
| | 5.2 | Speed torque characteristic of motor and load | | | | | | |
| | 5.3 | Quadrantal diagram of speed torque characteristics | | | | | | |
| | 5.4 | Dynamics of motor load combination | | | | | | |
| 6 | | **Electric Braking :** | 04 | 07 | CO5 | 35% | 35% | 30% |
| | 6.1 | Types of braking | | | | | | |
| | 6.2 | Braking while lowering and stopping of loads | | | | | | |
| | 6.3 | Electric braking of dc and ac motors | | | | | | |
| 7 | | **Electric Drives :** | 08 | 13 | CO5 | 30% | 30% | 40% |
| | 7.1 | Concept of Electric Drive System | | | | | | |
| | 7.2 | DC Drives:<br>Single Phase Half & Full Wave Converter<br>Three Phase Half & Full Wave Converter Drives.<br>Chopper Drives while motoring & braking | | | | | | |
| | 7.3 | AC Drives:<br>Three Phase Induction Motor Drives while motoring and braking operation | | | | | | |
| 8 | | **Industrial Applications :** | | | | | | |
| | 8.1 | Switch Mode Power Supply (SMPS)<br>Flyback, push-pull, half & full bridge converter | 08 | 13 | CO5 | 30% | 30% | 40% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 8.2 | Uninterruptible Power Supplies (UPS) Short Break, No Break type | | | | | | |
| | 8.3 | Static Switches(Single Phase AC & DC) | | | | | | |
| | 8.4 | Solid State Relays ( AC & DC) | | | | | | |
| | 8.5 | Induction Heating ,Induction cooking application | | | | | | |
| | 8.6 | Battery Charger | | | | | | |
| | 8.7 | Emergency Lighting System | | | | | | |
| | 8.8 | 1Ø light dimmer circuit using diac and triac | | | | | | |
| | | | **48** | **80** | | | | |

**Legends:** R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).

**Practical Course Outcomes:**

Student should be able to

| | |
|---|---|
| CO1 | Use power electronic devices in converter, inverter, cycloconverter and choppers |
| CO2 | Use converter and chopper circuits in dc and ac motoring and braking applications |
| CO3 | Use thyristor in industrial applications |

**List of Practicals :**

| Sr. No. | Unit | Practical | Approx Hrs | CO |
|---|---|---|---|---|
| 1 | 1 | Study of single phase half wave converter ( R, RL, RL load & FD) | 03 | 1 |
| 2 | 1 | Study of single phase full wave midpoint converter ( R and RL load) | 03 | 1 |
| 3 | 2 | Single Phase Hlaf bridge inverter with R and RL loads | 03 | 1 |
| 4 | 2 | Basic Series Inverter | 03 | 1 |
| 5 | 2 | Sinusoidal Pulse Width Modulated Inverter | 03 | 1 |
| 6 | 3 | Step up cycloconvertrer | 03 | 1 |

| | | | | |
|---|---|---|---|---|
| 7 | 3 | Step down cycloconverter | 03 | 1 |
| 8 | 4 | Step down chopper | 03 | 1 |
| 9 | 4 | Step up chopper | 03 | 1 |
| 10 | 7 | Speed control of separately excited dc motor using Class A Chopper | 03 | 2 |
| 11 | 8 | Study of Battery charger circuit using SCR | 03 | 3 |
| 12 | 8 | Single Phase Controlled Light Dimmer circuit using Diac & Triac | 03 | 3 |

**Text Books:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Dr. P. S. Bimbhra | Power Electronics, 6th Edition | Khanna Publisher |
| 2 | M Chilikin | Electric Drives | MIR Publishers |
| 3 | Dr. S. K. Pillai | A first course on electric drives, 2nd Edition | John Wiley Publishers |

**Reference books and Websites:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Khanchandani, Singh, Tata McGraw-Hill. | Power Electronics, 2nd Edition | Tata McGraw Hill. |
| 2 | M. H. Rashid | Power Electronics, Circuits, Devices and Applications, 3rd Edition | Pearson Education |
| 3 | A. P. Connolly,R. W. Fox F. B. Golden | GEC SCR Manual 5th or 6th Edition | General Electric |

**Websites:**

1) http://www.ssit.edu.in/dept/assignment/pelabmanual.pdf
2) http://www.ee.iitgp.ernet.in/faci_pe.php
3) http://www.ece.umn.edu/groups/power/labs/pe/pe_manual.pdf

| Curriculum Coordinator | Head | Dean - Diploma |
|---|---|---|
| | Diploma | |

| | |
|---|---|
| COURSE NAME | :DIPLOMA IN ELECTRONICS ENGINEERING |
| COURSE CODE | :DELnE |
| SEMESTER | :SIXTH |
| SUBJECT TITLE | :ADVANCE COMMUNICATION SYSTEM |
| SUBJECT CODE | :173EX62 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 3 | - | 2 | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25 | 10 | 25 | 10 | 150 |

**Course Objectives:**

The student will be able to:

1. Identify the different types of antenna and their applications.
2. To identify the use of microwave components and devices in microwave applications and measurements.
3. To know about evolution of satellite technology, different types of satellite missions and areas of application of satellite technology.
4. To understand about RADAR and their applications.

**Course Outcomes:**

| | |
|---|---|
| CO1 | Student should able to understand microwave devices and its amplification. |
| CO2 | Students should get brief idea of various satellite technologies, different types of satellite missions and areas of application of satellite technology. |
| CO3 | Students will get idea about RADAR and their use. |
| CO4 | Students should understand the construction, working and uses of optical communication system and its components. |

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Course Content:

| SECTION-I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 1 | | **Microwave Devices** | 06 | 12 | CO1 | 30% | 40% | 30% |
| | **1.1** | Microwave vacuum tube devices. Construction, working, specifications and applications of Two cavity Klystron amplifier, Reflex Klystron, Magnetron, TWT | | | | | | |
| | **1.2** | Microwave semiconductor devices. Construction, working and applications of Gunn diode, IMPATT diode, Tunnel diode | | | | | | |
| **2** | | **Satellite Communication** | 12 | 16 | CO2 | 40% | 40% | 20% |
| | **2.1** | Introduction, Kepler's First Law, Kepler's Second Law, Kepler's Third Law | | | | | | |
| | **2.2** | Definitions of Terms for Earth-Orbiting Satellites, Orbital Elements, Apogee and Perigee Heights, Orbit Perturbations, Effects of a non spherical earth, Atmospheric drag. | | | | | | |
| | **2.3** | Satellite angles, satellite repeaters, Station keeping, attitude control, satellite positioning. | | | | | | |
| | **2.4** | LEO, MEO, GEO satellite overview | | | | | | |
| | **2.5** | Satellite communication system, Transponders, Satellite frequency allocation and frequency reuse. | | | | | | |
| **3** | | **Radar Systems** | 6 | 12 | CO3 | 40% | 30% | 30% |
| | **3.1** | Introduction to Radars, Basic Principles of Radar, radar equation. (Related Problems) | | | | | | |
| | **3.2** | Types of Radars, Display Methods: A-Scope, PPI, Automatic target detection | | | | | | |
| | **3.3** | MTI system: Block diagram of fundamental MTI radar system with power amplifier output. | | | | | | |
| **SECTION-II** | | | | | | | | |
| **4** | | **Fundamentals of optical fiber** | 10 | 16 | CO4 | 40% | 30% | 30% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 4.1 | Definition & concept of reflection, refraction dispersion, diffraction, absorption & scattering with help of light theory | | | | | | |
| | 4.2 | Snell's law, Definition of critical angle, numerical aperture, acceptance angle, acceptance cone.<br>Numerical based on numerical aperture, acceptance angle, acceptance cone. | | | | | | |
| | 4.3 | Block diagram of Fiber Optic communication system , Advantages & disadvantages of Fiber Optic communication | | | | | | |
| 5 | | **Optical sources and detectors** | | | | | | |
| | 5.1 | Optical fiber types & characteristics. Losses in optical fiber: Bending loss, Absorption loss, Scattering loss, Dispersion loss, Radiation loss, Coupling loss. (No numericals) | | | | | | |
| | 5.2 | Optical Sources:<br>• Light Emitting Diode (LED)– LED construction, working principle and characteristics of LED, LED spectral Bandwidth, Advantages and Disadvantages of LED.<br>• LASER- Light Amplification by Stimulated Emission and Radiation<br>• Laser diode construction, working principle and characteristics of laser diode<br>Performance characteristics of Laser diode.<br>• Comparison of LED and LASER Diode | 12 | 20 | CO4 | 40% | 40% | 20% |
| | 5.3 | Optical Detector<br>• PIN Diode<br>• Photo Diode<br>• Avalanche Photodiode<br>• Comparison of different optical detectors.<br>• Device characteristics: Responsivity, Dark current, photo detector noise | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 | | Connectors and Splicers | 02 | 04 | CO4 | 40% | 40% | 20% |
| | 6.1 | Attenuation measurements: OTDR block diagram, working principle, and OTDR trace. | | | | | | |
| | | | 48 | 80 | | | | |

**Practical Course Outcomes:**

Student should be able

| | |
|---|---|
| CO1 | To analyze characteristics of microwave devices. |
| CO2 | To understand the concept of fiber optic sources and detectors |

**List of Practical/Assignments/Tutorials:**

| Sr. No. | Unit | Practical/Assignment | Approx. Hours | CO |
|---|---|---|---|---|
| 1 | 1 | To write specifications of Microwave Test Bench and five major Microwave components. | 2 | CO1 |
| 2 | 1 | To analyze the characteristics of Reflex Klystron. | 2 | CO1 |
| 3 | 1 | To determine frequency and wavelength using Reflex klystron. | 2 | CO1 |
| 4 | 1 | To verify V-I characteristics of Gunn diode | 2 | CO1 |
| 5 | 4 | To study fiber optic link for analog signal. | 2 | CO2 |
| 6 | 4 | To study fiber optic link for digital signal. | 2 | CO2 |
| 7 | 4 | To measure numerical aperture (NA) of an optical fiber. | 2 | CO2 |
| 8 | 5 | To measure the bend loss in FOC . | 2 | CO2 |
| 9 | 5 | To measure propogation loss in optical fiber using optical power meter | 2 | |
| 10 | 5 | To verify V-I characteristics of different color LED | 2 | CO2 |
| 11 | 5 | To verify V-I characteristics of photo-diode (Detector) at different luminance.(using multisim) | 2 | CO2 |

**NOTE: Industrial visit for satellite communication or radar system.**

**Text Books:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Frenzel | Communication Electronics | Tata Mc-graw Hill |
| 2 | Samuel Liao. | Microwave Devices and circuits | 3rd edition PHI Publication |
| 3 | Anil K. Maini Varsha Agrawal. | Satellite Technology-Principles And | John Wiley & Sons Ltd, 3rd edition, 2014 |

| | | | |
|---|---|---|---|
| | | Applications. | |
| 4 | Merill Skolnik | Introduction to RADAR Systems | TataMcgraw Hill , Third Edition |
| 5 | Gerd Keiser | Optical Fiber Communication, 5th ed. | McGrow-Hill Publication |

**Reference books and Websites:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Kennedy Davis | Electronic Communication System. | Tata McGraw Hill. |
| 2 | Michael | Satellite Communication Engineering. | Olorunfunmi Kolawole. CRC press. |
| 3 | G. Gonzalez Prentice | Microwave Transistor Amplifiers: Analysis and Design. | Hall of India. |

**Website:**

1. www.nptel.com
2. https://www.isro.gov.in/applications/satellite-communication

| Curriculum Coordinator | Head | Dean - Diploma |
|---|---|---|
| | Diploma | |

| | |
|---|---|
| DIPLOMA PROGRAMME | : DIPLOMA IN ELECTRONICS ENGINEERING |
| PROGRAMME CODE | : DElnE |
| SEMESTER | : SIXTH |
| COURSE TITLE | : EMBEDDED SYSTEM |
| COURSE CODE | : 173EX63 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 3 | - | 3 | 6 | 3 | 80 | 32 | 20 | 100 | 40 | 25 | 10 | - | - | 25 | 10 | 150 |

**Course Objectives:**

After studying this subject, students will be able to

1. Introduce to embedded systems.
2. Design and development of small Embedded Systems.
3. Interfacing various I/O devices to microcontroller.
4. Understand real time operating systems.

**Course Outcomes:**

Student should be able to

| | |
|---|---|
| CO1 | Define and explain different embedded systems design technologies and analyze the Real – Time Operating System architecture. |
| CO2 | Understand and explain key concepts of embedded systems like types of memory, system communication protocol, IO, timers, interrupts and interaction with peripheral devices. |
| CO3 | Achieve proficiency in programming environment such as C programming/ assembly programming, used to develop embedded systems and able to debug the program for various embedded system |
| CO4 | Introduction to arduino and raspberry pi. |

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Course Content:

| SECTION-I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 1 | | **Introduction of Embedded System** | 06 | 10 | CO1 | 30% | 60% | 10% |
| | 1.1 | Processor in the system<br>Different Hardware Units.<br>Software Embedded into System.<br>Exemplary Embedded system. | | | | | | |
| | 1.2 | System –On-Chip (SOC) & VLSI system. | | | | | | |
| | 1.3 | Terminologies: RISC,CISC, VLIW | | | | | | |
| | 1.4 | Fundamental Architecture : Harvard, Von Neumann | | | | | | |
| 2 | | **Communication Protocols:** | 08 | 14 | CO1<br>CO2 | 30% | 40% | 40% |
| | 2.1 | Need of communication interface in embedded system. | | | | | | |
| | 2.2 | Serial Communication – RS-232, I2C, CAN, USB, Bluetooth, RFID | | | | | | |
| | 2.3 | Parallel Communication – ISA, PCI,PCI-X | | | | | | |
| | 2.4 | Advanced I/O buses | | | | | | |
| 3 | | **Memory organization:** | 10 | 16 | CO1<br>CO2 | 20% | 40% | 40% |
| | 3.1 | Structural units in processor. | | | | | | |
| | 3.2 | Processor selection | | | | | | |
| | 3.3 | Memory devices & memory selection | | | | | | |
| | 3.4 | Memory Allocation | | | | | | |
| | 3.5 | DMA | | | | | | |
| | 3.6 | Interfacing processor & I/P O/P device | | | | | | |
| **SECTION-II** | | | | | | | | |
| 4 | | **Embedded programming(assembly/c):** | 06 | 10 | CO1CO2 | 10% | 40% | 50% |
| | 4.1 | Assembly Language V/S Embedded C. | | | | | | |
| | 4.2 | Instruction set of 8051 | | | | | | |
| | 4.3 | Programming with 'C': Input/output operation, Bit/Byte operations, Arithmetic and Logical operations on data, Time delay routines, Timer/Counter operations, Generation of patterns on port lines, Serial Communication. | | | | | | |
| 5 | | **I/O interfacing with 8051:** | 08 | 12 | CO2<br>CO3 | 10% | 40% | 50% |
| | 5.1 | Interfacing Keys, LEDs, matrix keyboard, relay and LCD and its programming with 'C'. | | | | | | |
| | 5.2 | Interfacing of ADC & DAC and its programming with 'C' for generation of different patterns. | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 5.3 | Interfacing Stepper Motor, DC Motor and its programming with 'C'. | | | | | | |
| 6 | | **Real Time Operating System:** | 08 | 13 | CO1 | 20% | 60% | 20% |
| | 6.1 | Real Time and Embedded systems OS | | | | | | |
| | 6.2 | Requirement, Need, Specification of RTOS in Embedded systems | | | | | | |
| | 6.3 | Architecture of Real Time Operating System (RTOS) | | | | | | |
| | 6.4 | Interrupt routines in RTOS | | | | | | |
| | 6.5 | RTOS task scheduling models | | | | | | |
| | 6.6 | Mutual Exclusion, Starvation, Deadlock | | | | | | |
| 7 | | **Introduction to Arduino and raspberry pi** | 02 | 05 | CO4 | 40% | 60% | - |
| | 7.1 | Architecture of Arduino uno and Rasberry pi | | | | | | |
| | 7.2 | Applications of Arduino uno and Raspberri Pi | | | | | | |

**Practical Course Outcomes:**

Student should be able to

| | |
|---|---|
| CO1 | Develop program for various embedded system and to Interfacing of input/output devices. |
| CO2 | Write and execute program(Assembly/C) in keil and simulate on proteus software |

**List of Practical/Assignments/Tutorials:**

| Sr. No | Unit | Practical/Assignment | Approx. Hours | CO |
|---|---|---|---|---|
| 1 | 1,4 | Write a program to input and output data operation via ports of 8051. | 3 | 1,2 |
| 2 | 1,4 | Write a program to perform arithmetic and logical operations. | 3 | 1,2 |
| 3 | 1,4 | Write a program to blink a LED connected on port pin. | 3 | 1,2 |
| 4 | 1,4 | Write a program to generate square wave on port of 8051. | 3 | 1,2 |
| 5 | 1,5 | Write a program to read the status of key and turn ON/OFF a LED connected to port pins of 8051. | 3 | 1,2 |
| 6 | 1,5 | Write a program to ON/OFF a bulb through a relay connected to port pin of 8051. | 3 | 1,2 |
| 7 | 1,5 | Write a program to Interface 7 segment display to 8051 and to display 1 to 9 numbers on it. | 3 | 1,2 |
| 8 | 1,5 | Write a program to Interface 7x5 dot matrix displays to 8051 and to | 3 | 1,2 |

| | | | | |
|---|---|---|---|---|
| | | display an alphabet on it. | | |
| 9 | 1,5 | Write a program to Interface 16 x 2 LCD to 8051 and to display string on it. | 3 | 1,2 |
| 10 | 1,5 | Write a program to Interface a 4 x 4 matrix keyboard and 16 x 2 LCD to 8051 and read and display key code on LCD. | 3 | 1,2 |
| 11 | 1,5 | Write a program to Interface 8 bit ADC and 16 x 2 LCD to 8051 and to read and display data of ADC on LCD. | 3 | 1,2 |
| 12 | 1,5 | Write a program to interface dc motor. | 3 | 1,2 |
| 13 | 1,5 | Write a Program to Interface stepper motor. | 3 | 1,2 |
| 14 | 1,5 | Write program to rotate stepper motor with different speed in clockwise and counter clockwise direction. | 3 | 1,2 |
| 15 | 1,2 | Write a program to message "YES" serially at 9600 baud rate 8 bit data. | 3 | 1,2 |

**Text Books:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Raj Kamal, | Embedded Systems: Architecture, Programming and Design | Tata McGraw- Hill, 2nd Edition |
| 2 | Mazidi & McKinlay | The 8051 Microcontroller and Embedded System Using Assembly and C | Prentice Hall |
| 3 | Frank Vahid & Tony Givargis | Embedded System Design A Unified Hardware/Software Introduction | Wiley |
| 4 | Dr K.V.K.K. Prasad | Embedded/Real-Time Systems: Concept, Design & Programming | Dreamtech Press |

**Reference books and Websites:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | J W Stewart and K X Miao | The 8051 Microcontroller: Hardware, Software and Interfacing | Prentice Hall, 2nd Edition |
| 2 | M Predko | Programming & Customizing 8051 Microcontrollers | Tata McGraw-Hill, 1st Edition |
| 3 | Barnett, Cox, O'Cull | Embedded C Programming and the Atmel AVR | Delmar Cengage Learning , 2nd Edition |
| 4 | David E. Simon | An Embedded Software Primer | Pearson Education |

| | | | |
|---|---|---|---|
| 5 | Simon Monk | O'Reilly Media, Inc. | O'Reilly Media, Inc. |

**Websites:**

1. www.nptel.ac.in
2. www.keil.com
3. www.dauniv.ac.in/coursematerial.php

| Curriculum Coordinator | Head | Dean - Diploma |
|---|---|---|
| | Diploma | |

| | |
|---|---|
| DIPLOMA PROGRAMME | : DIPLOMA IN ELECTRONICS ENGINEERING |
| PROGRAMME CODE | : DElnE |
| SEMESTER | : SIXTH |
| COURSE TITLE | : MOBILE COMMUNICATION |
| COURSE CODE | : 173EX64E1 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 3 | - | 2 | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25 | 10 | 25 | 10 | 150 |

**Course Objectives:**

After studying this subject, students will be able to

1. Understand the concept of Mobile radio propagation, cellular system design.
2. Analyze the mobile communication evolution of 2G, 3G in detail.
3. Study mobile technologies like GSM and CDMA.
4. Have overview of emerging technologies for 4 G standards.

**Course Outcomes:**

Student should be able to

| | |
|---|---|
| CO1 | Understand of evolution of mobile communication generations 2G, 2.5G, 3G with their characteristics and limitations. |
| CO2 | Understand the cellular concept such as frequency reuse, hand off and coverage & capacity in cellular system. |
| CO3 | Collaberate different indoor and outdoor propagation models related to losses and different types |

60

| | |
|---|---|
| | of fading and multiple access technologies. |
| CO4 | Analyze GSM concepts and architecture, frame structure, services provided. |
| CO5 | Understand the Service Aspects, Network reference Model and Security aspects, Radio aspects of IS 95 CDMA systems and features of SS7. |
| CO6 | Have an idea regarding emerging technologies required for third and fourth generation mobile systems. |

**Course Content:**

**SECTION-I**

| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
|---|---|---|---|---|---|---|---|---|
| 1 | | **Introduction to Wireless Communication System** | 6 | 10 | CO1 | 50% | 50% | - |
| | 1.1 | Evolution of mobile radio communications (2G,2.5G and 3G wireless system)<br>5. Mobile radio system around the world (AMPS, IS 95,GSM, N - AMPS )<br>6. Applications of wireless communication systems<br>i. Paging System.<br>ii. Cordless telephone system.<br>iii. Cellular telephone system.<br>7. Call processing in cellular telephone system. | | | | | | |
| | 1.2 | • Block Diagram and operation of frequency synthesizer, transmitter, Receiver, Logic Unit and Control unit. Essential features of hand set.<br>• Definition of mobile base station, Mobile control station. | | | | | | |
| 2 | | **The Cellular Concept** | | | | | | |
| | 2.1 | Introduction to cellular system.<br>• Frequency reuse concept.<br>• Cellular system operation and Planning | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Principles.<br>• System Architecture | 10 | 18 | CO2 | 30% | 30% | 40% |
| | 2.2 | • Location updating and call setup.<br>• Hand off strategies and Power control. | | | | | | |
| | 2.3 | Interference and system capacity.<br>• Co channel interference & system capacity.<br>• Channel planning for wireless system.<br>• Adjacent channel Interference.<br>• Nemericals | | | | | | |
| | 2.4 | Improving coverage and capacity in cellular system.<br>a) Cell splitting<br>b) Sectoring<br>c) Micro cell zone concept. | | | | | | |
| 3 | | **Mobile Radio Propagation and multiple access** | | | | | | |
| | 3.1 | Reflection, ground reflection model (2 ray model) | | | | | | |
| | 3.2 | Diffraction, practical link budget design using path loss models. | | | | | | |
| | 3.3 | Multiple Access Technologies for Cellular systems :<br>• Overview ofFrequency Division Multiple access, Time Division Multiple access, Code Division Multiple access<br>• Spread Spectrum Multiple access : FHMA,CDMA,<br>• Space Division Multiple access.<br>• Numerical | 08 | 12 | CO3 | 40% | 30% | 20% |
| | | **SECTION-II** | | | | | | |
| 4 | | **Global System for Mobile (GSM)** | | | | | | |
| | 4.1 | Concept of GSM, the European TDMA Digital Cellular standard. | | | | | | |
| | 4.2 | GSM Standardization and service aspects .GSM | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Architecture. | 6 | 12 | CO 4 | 35% | 50% | 15 % |
| | 4.3 | GSM Radio Aspects. | | | | | | |
| | 4.4 | Security Aspects. | | | | | | |
| | 4.5 | GSM Protocol Model | | | | | | |
| | 4.6 | Typical flow sequence in GSM | | | | | | |
| 5 | | **IS 95 and SS7** | 8 | 12 | CO 5 | 35% | 50% | 15 % |
| | 5.1 | IS 95:Concept of IS 95, the North American CDMA Digital Cellular standard. Introduction, Service Aspects, Network reference Model and Security aspects, Radio aspects, Key features of IS 95 CDMA systems | | | | | | |
| | 5.2 | Signal system no.7 (SS7) : Concept of SS7, NSP of SS7,Signaling Traffic in SS7, SS7 services and performance. | | | | | | |
| 6 | | **Modern wireless Communication System and Networks** | 10 | 16 | CO 6 | 40% | 40% | 20 % |
| | 6.1 | Evolution for 2.5 G TDMA standards HSCSD for 2.5 G GSM ,GPRS for 2.5 G GSM and IS-136, EDGE for 2.5vg GSM and IS-136, IS-95B for 2.5 G CDMA. | | | | | | |
| | 6.2 | IMT 2000: IMT 2000 Vision and Evolution Aspects, Radio Spectrum for IMT -2000 | | | | | | |
| | 6.3 | Third Generation (3G) Wireless Networks: 3G W-CDMA (UMTS) (Universal mobile Telecommunication system.),3G CDMA 2000,3G-TD-SCDMA (synchronous) | | | | | | |
| | 6.4 | Wireless Local Area Networks: Features of Bluetooth and Personal Area Networks(PANS), Concept of Ad voc mobile communication for 4G.,4G wireless architecture and capabilities, characteristics. | | | | | | |
| | | | **48** | **80** | | | | |

**Legends:** R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).

**Practical Course Outcomes:**

Student should be able to

| | |
|---|---|
| CO1 | Have an overview of evolution of radio communication and an idea about hardware components required for mobile communication |
| CO2 | Analyze the effect of different parameters of the cell site on system. |
| CO3 | Design and simulate modules for small scale fading , path loss, etc. and multiple access technologies. |
| CO4 | Understand the GSM and IS-95 CDMA concepts |
| CO5 | Be aware of different modern wireless communication system and networks for mobile radio communication |

**List of Practical/Assignments/Tutorials:**

| Sr. No. | Unit | Practical/Assignment | Approx. Hours | CO |
|---|---|---|---|---|
| 1 | 2 | To analyze the effect of the cluster size on system capacity | 2 | 2 |
| 2 | 3 | To analyze the Friis equation for the free space propagation | 2 | 3 |
| 3 | 3 | To study the effect of the diffraction on gain of the system | 2 | 3 |
| 4 | 2 | To find the adjacent co-channel cells of the given cell in a cluster | 2 | 2 |
| 5 | 2 | To analyze the effect of the interference on system capacity | 2 | 2 |
| 6 | 3 | To generate the Pseudo random noise signal used in CDMA technique | 2 | 3 |
| 7 | 2 | To Plot the directional pattern of the given antenna. | 2 | 2 |
| 8 | 3 | To study the effect of the small scale fading on gain of the system | 2 | 3 |
| 9 | 3 | To analyze the relation between the large scale path loss on gain of the system | 2 | 3 |
| 10 | 6 | To study different Modern wireless Communication System for mobile radio communication | 2 | 5 |

| | | | | |
|---|---|---|---|---|
| 11 | 6 | To study different Modern wireless Networks for mobile radio communication | 2 | 5 |
| 12 | 4 | Prepare Case study on GSM technology, its network, GSM capability & data Services for different regions | 2 | 4 |
| 13 | 1 | Study & prepare report on cell site , distance coverage , antennas used & other components. | 2 | 1 |
| 14 | 5 | Prepare Report on IS-95 technology, its network, capability & data Services for different countries. | 2 | 4 |

**Text Books:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | T.S. Rappaport | Wireless Communication Principles & Practice | Pearson Education |
| 2 | William Lee | Mobile Cellular Tele communication | Tata McGraw Hill |
| 3 | C K Toh | Ad Voc Mobile wireless Networks | Pearson Education |

**Reference books and Websites:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Raj Pandya | Mobile and Personal communication system and services | IEEE PRESS PHI |
| 2 | Steffano Basagni Marco, Silvia, Ivan | Mobile AD HOC Network | Wiley India Pvt. Ltd. |

**Websites:**

1. www.nptel.com
2. www.slideshare.net

| Curriculum Coordinator | Head | Dean - Diploma |
|---|---|---|
| | Diploma | |

| | |
|---|---|
| DIPLOMA PROGRAMME | : DIPLOMA IN ELECTRONICS ENGINEERING |
| PROGRAMME CODE | : DElnE |
| SEMESTER | : SIXTH |
| COURSE TITLE | : ELECTRONIC CIRCUIT DESIGN |
| COURSE CODE | : 173EX64E2 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 3 | - | 2 | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25 | 10 | 25 | 10 | 150 |

**Course Objectives:**

1. To provide students with a sound foundation in electronics and prepare them for the industry requirements.
2. To apply the electronics fundamentals to formulate, solve and analyze hardware problems.

**Course Outcomes:**

After successful completion of the course student will be able to

| | |
|---|---|
| CO1 | Analyze the frequency response of amplifier using transistor for high frequencies. |
| CO2 | Design of the multistage amplifiers using transistors for the given gain, bandwidth and coupling. |
| CO3 | Design of the differential amplifier using BJT/FET/MOSFET/CMOS with load. |
| CO4 | Design of the electronic circuits to generate the signals of given frequencies. |
| CO5 | Design of the Power amplifiers and heat sink using BJT/MOSFET. |
| CO6 | Design of the voltage regulator for given specifications. |

Course Content:

| SECTION-I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 1 | | **Frequency Response of Amplifier** | 8 | 10 | 1 | 40% | 40% | 20% |
| | 1.1 | High Frequency parameter of BJT, Amplifier Frequency Response | | | | | | |
| | 1.2 | System Transfer Functions, S-Domain Analysis, First order functions | | | | | | |
| | 1.3 | High frequency response of BJT, FET and MOSFET amplifier analysis | | | | | | |
| 2 | | **Multistage Amplifier** | 10 | 15 | 2 | 20% | 40% | 40% |
| | 2.1 | Design of two stage BJT, FET and MOSFET amplifiers | | | | | | |
| | 2.2 | Design of BJT-FET hybrid amplifier | | | | | | |
| 3 | | **Differential Amplifier** | 6 | 15 | 3 | 40% | 40% | 20% |
| | 3.1 | BJT, FET and MOSFET Differential amplifier analysis and design | | | | | | |
| | 3.2 | Design of CMOS Differential amplifier with active load | | | | | | |
| **SECTION-II** | | | | | | | | |
| 4 | | **Oscillator's Design** | 7 | 15 | 4 | 20% | 40% | 40% |
| | 4.1 | Oscillator basics, Barkhausen criterion | | | | | | |
| | 4.2 | Analysis and design of:<br>• RC Phase Shift Oscillator<br>• Wein bridge Oscillator.<br>• Crystal Oscillator.<br>• Hartley oscillator.<br>• Colpitts Oscillators. | | | | | | |
| 5 | | **Design of Power Amplifiers** | 11 | 15 | 5 | 20% | 40% | 40% |
| | 5.1 | Power Amplifiers, Power transistors – Power BJTs, | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Power MOSFETs. | | | | | | |
| | 5.2 | Class-A Power Amplifiers. Transformer coupled Class-A amplifier | | | | | | |
| | 5.3 | Class B amplifier, Class B Transformer coupled Push-Pull Circuits. Complementary Class B Power Amplifier | | | | | | |
| | 5.4 | Class-AB Push-Pull Power amplifier | | | | | | |
| | 5.5 | Heat sinks, Design of Heat sinks for power amplifier devices | | | | | | |
| 6 | | **Design of Voltage Regulators** | 6 | 10 | 6 | 20% | 40% | 40% |
| | 6.1 | Overview of parameters of a voltage regulator. Line regulation, Temperature co-efficient of output voltage, ripple rejection ratio etc. | | | | | | |
| | 6.2 | Design of three pin fixed voltage regulator IC (Positive series 78XX & Negative series 79XX) | | | | | | |
| | 6.3 | Design of adjustable three pin voltage regulator IC (Positive LM317 & Negative LM337) | | | | | | |
| | | **TOTAL** | **48** | **80** | | | | |
| **Legends:** R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy). | | | | | | | | |

**Practical Course Outcomes:**

1. To deliver the core concepts and reinforce the analytical skills learned in Electronic-I and Electronics-II
2. To motivate students to use semiconductor devices for designing and analyzing electronic Circuits which will help them to understand the fundamentals of electronics circuit design.

**Intellectual Skills to be developed:**

| | |
|---|---|
| CO1 | To Analyze and design multistage electronic Circuits. |
| CO2 | To design the electronic circuits for the given specifications say, voltage gain, frequency range (bandwidth) and output impedance, output voltage. |
| CO3 | To analysis the capabilities and limitations of use of semiconductor devices to design the electronic circuits practically. |

List of Practical/Assignments/Tutorials:

| Sr. No. | Unit | Practical/Assignment | Approx. Hours | CO |
|---|---|---|---|---|
| 1 | 1 | Plot the frequency response of low frequency amplifier using transistor for the given gain and bandwidth. | 2 | 1 |
| 2 | 2 | Design of two stage voltage amplifier using BJT/FET/MOSFET for the given voltage gain and operating frequency range. | 2 | 1,2,3 |
| 3 | 2 | Design of the high frequency multistage amplifier using FET. | 2 | 1,2,3 |
| 4 | 2 | Design and analysis of the hybrid amplifier using BJT and FET. | 2 | 1,2,3 |
| 5 | 3 | Design and analyze the differential amplifier using BJT/FET/MOSFET. | 2 | 2,3 |
| 6 | 3 | Design of the differential amplifier using CMOS with active load. | 2 | 2,3 |
| 7 | 4 | Design of RC phase shift oscillator using the transistor for the desired output frequency. | 2 | 2,3 |
| 8 | 4 | Design of Colpitts oscillator using the transistor for the given output frequency. | 2 | 2,3 |
| 9 | 4 | Design of Hartley Oscillator using the transistor for the required output frequency. | 2 | 2,3 |
| 10 | 4 | Design of Wein Bridge oscillator using the transistor for the given output frequency. | 2 | 2,3 |
| 11 | 5 | Design of class A/B power amplifier using Power transistor. | 2 | 2,3 |
| 12 | 5 | Design of class AB push-pull power amplifier. | 2 | 2,3 |
| 13 | 5 | Design of the heat sinks for power amplifier. | 2 | 2,3 |
| 14 | 6 | Design of a fixed positive voltage regulator using 78XX series IC (7805,7808,7812,7815, etc.) | 2 | 2 |
| 15 | 6 | Design of a fixed negative voltage regulator using 79XX series IC (7905,7908,7912,7915, etc.) | 2 | 2 |
| 16 | 6 | Design of ± 15 V, 750 mA dual power supply using 7815 & 7915 ICs. | 2 | 2 |
| 17 | 6 | Design of a variable positive voltage regulator to provide the output of 1.25 V to 30 V using LM317. | 2 | 2 |
| *Note : At least some practical should be conducted using Multisim or MATLAB | | | | |

**Text Books:**

| Sr. | Author | Title | Publisher and Edition |
|---|---|---|---|

| No. | | | |
|---|---|---|---|
| 1 | Mohammad Rashid | Microelectronics circuits (Analysis and design) | 2nd edition, Cengage learning |
| 2 | Donald A Neamen | Electronic circuit analysis and design | 3rd Edition, McGraw Hill Education |
| 3 | Martin Roden, Gordon Carpenter, William Wieserman | Electronic Design | 4th edition, Shroff Publishers, 2002 |
| 4 | Ramakant Gayakwad | Op-amps and Linear Integrated Circuits | 4th edition, Prentice Hall, 2000 Education |

**Reference books and Websites:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Adel Sedra, Kenneth Smith | Microelectronic circuits | 4th edition, Oxford University Press 1998 |
| 2. | Donald Schilling, Charles Belove | Electronic circuits Discrete and Integrated | 3rd edition, McGraw Hill International edition 1989. |

**WEBSITE:**

1. www.nptel.ac.in
2. **https://www.electrical4u.com/electrical-engineering-articles/electronics-devices**

| Curriculum Coordinator | Head Diploma | Dean - Diploma |
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70

| | |
|---|---|
| DIPLOMA PROGRAMME | : DIPLOMA IN ELECTRONICS ENGINEERING |
| PROGRAMME CODE | : DElnE |
| SEMESTER | : SIXTH |
| COURSE TITLE | :SIGNALS AND SYSTEMS |
| COURSE CODE | : 173EX64E3 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | ISA | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 3 | - | 2 | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25 | 10 | 25 | 10 | 150 |

**Course Objectives:**

After studying this subject, students will be able to

1. To understand the basic properties of signal & systems and the various methods of classification.
2. To learn Laplace Transform, Fourier transform and their properties
3. To know Z transform and their properties.
4. To characterize LTI systems in the Time domain and various Transform domains.

**Course Outcomes:** Student should be able to

| | |
|---|---|
| CO1 | Analyze the properties and types of signals & systems. |
| CO2 | Apply Laplace transform and Fourier transform in signal analysis. |
| CO3 | Analyze continuous time LTI systems using Fourier and Laplace Transforms |
| CO4 | Analyze discrete time LTI systems using Z transform. |

Course Content:

| SECTION-I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 1 | | **Introduction and Classification of signals:** | 10 | 14 | CO1 | 20% | 20% | 60% |
| | 1.1 | Definition of signal, Continuous time and discrete time signal, | | | | | | |
| | 1.2 | Classification of signals as even, odd, periodic and non-periodic, deterministic and non-deterministic, energy and power. Problems on Signals classification signals. | | | | | | |
| | 1.3 | Elementary signals/Functions: exponential, sine, impulse, step and its properties, ramp, rectangular, triangular, signum functions. | | | | | | |
| | 1.4 | Operations on signals: Amplitude scaling, addition, multiplication, time scaling, time shifting and time folding. Problems based on operation of signals. | | | | | | |
| 2 | | **Introduction and classification of Systems:** | 6 | 12 | CO1 | 30% | 20% | 50% |
| | 2.1 | Definition and Classification of systems as linear and nonlinear, time variant and invariant, causal and non-causal, static and dynamic, stable and unstable, invertible. Problems on system classification. | | | | | | |
| | 2.2 | Time domain representation of LTI System. | | | | | | |
| | 2.3 | Concept of Convolution, definition of impulse response, convolution sum. Problems to find impulse response and convolution. | | | | | | |
| 3 | | **Laplace Transform:** | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3.1 | Definition & properties of Two-sided Laplace Transform. | 8 | 14 | CO1<br>CO2 | 10% | 20% | 70% |
| | 3.2 | Definition & properties of one-sided Laplace Transform, Problems based on properties of Laplace transform. | | | | | | |
| | 3.3 | Concept of Region of Convergence (ROC). Problems on ROC. | | | | | | |
| | 3.4 | Inverse Laplace transforms, System transfer function. Problems. | | | | | | |
| **SECTION-II** | | | | | | | | |
| 4 | | **Fourier Transform:** | 8 | 12 | CO1<br>CO2 | 10% | 20% | 60% |
| | 4.1 | Introduction to Fourier Transform (FT), Concept, and Applications. | | | | | | |
| | 4.2 | Properties of Fourier Transform with Problems | | | | | | |
| | 4.3 | Amplitude & phase spectra, Energy Spectral Density, Power Spectral Density. Problems based on Power and energy spectral density. | | | | | | |
| 5 | | **Z Transform:** | 8 | 12 | CO1<br>CO4 | 20% | 30% | 50% |
| | 5.1 | Definition & properties of Two-sided Z Transform | | | | | | |
| | 5.2 | Definition & properties of one-sided Z Transform | | | | | | |
| | 5.3 | Concept of Region of Convergence (ROC). Inverse Z Transform. Problems based on z and inverse z transform | | | | | | |
| 6 | | **Analysis of Systems:** | 8 | 16 | CO1<br>CO2<br>CO3<br>CO4 | 20% | 40% | 40% |
| | 6.1 | System Transfer function & Impulse response | | | | | | |
| | 6.2 | Frequency Response, Solution of a difference equation with problems. | | | | | | |
| | 6.3 | Introduction to Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Problems on FFT and DFT | | | | | | |
| | | | 48 | 80 | | | | |

**Legends:** R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).

**Practical Course Outcomes:**

Student should be able to

| | |
|---|---|
| CO1 | Get the knowledge of practically implementation of discrete time signal and its operation. |
| CO2 | Understand the rules and steps for convolution of any two signals. |
| CO3 | Understand the concept of z transform and inverse z transform. |
| CO4 | Understand the use of software tools for signal and system analysis. |

**List of Practical/Assignments/Tutorials:**

| Sr. No. | Unit | Practical/Assignment | Approx. Hours | CO |
|---|---|---|---|---|
| 1 | 1 | To generate discrete sequence using software tool | 1 | 1 |
| 2 | 1 | To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine) using software tool | 3 | 1,2 |
| 3 | 1 | To Perform time Shifting Operation on Sequence using software tool. | 2 | 1,2,3, 4 |
| 4 | 1 | To Perform time scaling Operation on Sequence using software tool. | 2 | 1,2,3, 4 |
| 5 | 1 | To Perform time folding Operation on Sequence using software tool | 2 | 1,2,3, 4 |
| 6 | 4 | To Perform Z Transform using software tool. | 2 | 1,3 |
| 7 | 4 | To Perform Inverse Z-Transform using software tool. | 2 | 1,2,3 |
| 8 | 6 | To find Poles, Zeros and gain from a given Z-Transform using software tool. | 2 | 1,2,3, 4 |
| 9 | 2 | To develop program for discrete convolution. | 2 | 2 |

Text Books:

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Simon Haykins and Barry Van Veen, | "Signals and Systems", | 2nd Edition, Wiley India. |
| 2 | Allan V.Oppenheim, S.Wilsky and S.H.Nawab | "Signals and Systems" | Pearson, 2007. |

**Reference books and Websites:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | M.J. Roberts | "Signals and Systems" | Tata McGraw Hill 2007 |
| 2 | Schaum's Outlines Series | "Signals and Systems" | Tata McGraw Hill |

**Websites:**

1. https://ocw.mit.edu/index.html
2. http://www.eas.uccs.edu/
3. https://nptel.ac.in/courses/117104074/

| Curriculum Coordinator | Head Diploma | Dean - Diploma |
|---|---|---|
| | | |

| | |
|---|---|
| DIPLOMA PROGRAMME | : DIPLOMA IN ELECTRONICS ENGINEERING |
| PROGRAMME CODE | : DElnE |
| SEMESTER | : SIXTH |
| COURSE TITLE | :Image Processing and Neural Networks |
| COURSE CODE | : 173EX64E4 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 3 | - | 2 | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25 | 10 | 25 | 10 | 150 |

**Course Objectives:**

After studying this subject, students will be able:

1. To cover the fundamentals and mathematical models in digital image processing.
2. To develop time and frequency domain techniques for image enhancement.
3. To expose the students to current technologies and issues in image processing.
4. To develop image processing applications in practice.
5. To Understand the concepts of artificial neural networks
6. To solve real world problems.

**Course Outcomes:** Student should be able to

| | |
|---|---|
| CO1 | Understand the fundamentals of image processing. |
| CO2 | Analyze the process of image enhancement in special and frequency domain |
| CO3 | Understand and Apply the technology for the segmentation of the given image. |
| CO4 | Compress and restore the images by using filtes. |
| CO5 | Understand the Basic Concepts and features of Neural Networks. |
| CO6 | Exposure to the applicability of neural networks. |

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Course Content:

| SECTION-I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 1 | | **Ch. 1 Image Fundamentals** | 6 | **08** | CO1 | 50% | 50% | - |
| | 1.1 | Image acquisition, sampling and quantization, image resolution, basic relationship between pixels, color images, RGB, HSI and other models<br>**Two Dimensional Transforms :** Discrete Fourier Transform, Discrete Cosine Transform, KL Transform, and Discrete Wavelet Transform | | | | | | |
| 2 | | **Ch. 2 Image Enhancement** | 9 | 16 | CO2 | 20% | 30% | 50% |
| | 2.1 | **Spatial Domain**<br>**Point Processing:** Digital Negative, contrast stretching, thresholding, gray level slicing, bit plane slicing, log transform and power law transform. | | | | | | |
| | 2.2 | **Neighborhood Processing**: Averaging filters, order statistics filters, high pass filters and high boost filters | | | | | | |
| | 2.3 | **Frequency Domain:** DFT for filtering, Ideal, Gaussian and Butterworth filters for smoothening and sharpening, and Homomorphic filters | | | | | | |
| | 2.4 | **Histogram Modeling:** Histogram equalization and histogram specification | | | | | | |
| 3 | | **Ch. 3 Image Segmentation** | 9 | 16 | CO3 | 20% | 30% | 50% |
| | 3.1 | **Image Segmentation** : Point, line and edge detection, edge linking using Hough transform and graph theoretic approach, thresholding, and region based segmentation. | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| | 3.2 | Dilation, erosion, opening, closing, hit or miss transform, thinning and thickening, and boundary extraction on binary images | | | | | | |
| SECTION-II | | | | | | | | |
| 4 | | **Ch. 4 Image Compression and Restoration** | 9 | 16 | CO4 | 20% | 30% | 50% |
| | 4.1 | **Image Compression:** Image Compression models, Information theory for Image Compression, lossy and lossless compression. | | | | | | |
| | 4.2 | **Image Restoration:** Degradation model, noise models, estimation of degradation function by modeling, restoration using Weiner filters and Inverse filters | | | | | | |
| 5 | | **Ch. 5 Introduction to Neural Networks and its Basic Concepts:** | 9 | 16 | CO5 | 35% | 65% | - |
| | 5.1 | Biological neurons and McCulloch and Pitts models of neuron<br>Types of activation functions<br>Neural networks architectures<br>Linearly separable and linearly non-separable systems and their examples | | | | | | |
| | 5.2 | Features and advantages of neural networks over statistical techniques<br>Knowledge representation, learning process, error-correction learning, concepts of supervised learning, and unsupervised learning | | | | | | |
| 6 | | **Ch. 6 Applications of Neural Networks:** | 6 | 8 | CO6 | 50% | 50% | -+ |
| | 6.1 | Pattern classification | | | | | | |
| | 6.2 | Handwritten character recognition | | | | | | |
| | 6.3 | Face recognition | | | | | | |
| | 6.4 | Image compression and decompression | | | | | | |
| | | | **48** | **80** | | | | |

**Legends:** R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).

Practical Course Outcomes:

Student should be able to

| | |
|---|---|
| CO1 | Perform basic operations on image |
| CO2 | Implement different types of transform and operations in frequency domain on given image. |
| CO3 | Segment, compress and restore the image. |
| CO4 | Understand the applications of neural networks |

**List of Practical/Assignments/Tutorials:**

| Sr. No. | Unit | Practical/Assignment | Approx. Hours | CO |
|---|---|---|---|---|
| 1 | 1 | To import and read an image in terms of pixels. | 2 | 1 |
| 2 | 1 | To convert colour image into black and white and grey scale image. | 2 | 1 |
| 3 | 1 | To implement different types of transform on given image. (Discrete Fourier Transform, Discrete Cosine Transform, KL Transform, and Discrete Wavelet Transform, etc.) | 2 | 2 |
| 4 | 2 | To apply the various operations in Frequency Domain on given image. ( DFT for filtering, Ideal, Gaussian and Butterworth filters for smoothening and sharpening, and Homomorphic filters) | 2 | 2 |
| 5 | 2 | To plot the Histogram for given image. | 2 | 2 |
| 6 | 3 | To perform the Image Segmentation | 2 | 3 |
| 7 | 4 | To perform the Image Compression | 2 | 3 |
| 8 | 4 | To perform the Image Restoration | 2 | 3 |
| 9 | 6 | To detect the face given in image | 2 | 4 |
| 10 | 6 | To study Pattern classification using neural networks | 2 | 4 |
| 11 | 6 | To study Handwritten character recognition using neural networks | 2 | 4 |

**Text Books:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Gonzales and Woods | *Digital Image Processing*‖, , | Pearson Education, India, Third Edition |
| 2 | Anil K.Jain | *Fundamentals of Image* | Prentice Hall of India, First |

| | | | |
|---|---|---|---|
| | | *Processing*‖, | Edition, 1989. |
| 3 | John W. Woods | *Multidimensional Signal, Image and Video Processing* | Academic Press 2012 |
| 4 | S. Rajsekaran and G. A. Vijaylakshmi Pai | *Neural Networks, Fuzzy Logic, and Genetic Algorithms* | PHI |
| 5 | Simon Haykin | *Neural Network- A Comprehensive Foundation* | Pearson Education |
| 6 | Thimothy J. Ross | *Fuzzy Logic with Engineering Applications* | Wiley India Publications |

**Reference books and Websites:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | J.R.Ohm | *Multimedia Communication Technology* | Springer Publication. |
| 2 | A.I.Bovik | *Handbook on Image and Video Processing* | Academic Press. |
| 3 | Laurence Fausett | *Fundamentals of Neural Networks* | Pearson Education |
| 4 | S. N. Sivanandam, S. Sumathi, and S. N. Deepa | *Introduction to Neural Network Using MATLAB* | Tata McGraw-Hill Publications |
| 5 | Bart Kosko | *Neural networks and Fuzzy Systems* | Pearson Education |

**Websites:**

1. https://nptel.ac.in/courses/117105079/
2. https://nptel.ac.in/courses/117105084/

| Curriculum Coordinator | Head | Dean - Diploma |
|---|---|---|
| | Diploma | |

RAMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA, MUMBAI-19.

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|---|---|
| COURSE NAME | DIPLOMA IN ELECTRONICS ENGINEERING |
| COURSE CODE | DELnE |
| SEMESTER | SIXTH |
| SUBJECT TITLE | Software skills |
| SUBJECT CODE | 173EX64E5 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 3 | | 2 | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | 25 | 10 | 25 | 10 | 150 |

**Course Objectives:**

After studying this subject, students will be able to:

1) Understanding / identifying the concepts of programming.
2) Interpret program output.
3) Debug and edit programs.
4) Develop small applications with the help of programs.

**Course Outcomes:**

| | |
|---|---|
| CO1 | Explore the basic terminologies and concept related to programming. |
| CO2 | To perform mathematical operations with the help of software. |
| CO3 | Analyze and understand logical structure of a computer program. |

**Course Content:**

| SECTION-I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | CO | R Level % | U Level% | A Level% |
| 1 | | Introduction to MATLAB | 6 | 10 | CO1 | 50% | 40% | 10% |
| | 1.1 | Brief Introduction Installation of MATLAB Key features | | | | | | |
| | 1.2 | MATLAB window, Command window | | | | | | |
| | 1.3 | Assigning variables and Operations | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| | | with variables | | | | | | |
| | 1.4 | Data files and Data types<br>Character and string | | | | | | |
| | 1.5 | Arrays and vectors<br>(Column vectors, Row vectors) | | | | | | |
| 2 | | Basic Mathematics and operations | 8 | 12 | CO2 | 40% | 40% | 20% |
| | 2.1 | BODMAS Rules Arithmetic operations | | | | | | |
| | 2.2 | Operators and special characters<br>(Mathematical and logical operators)<br>Solving arithmetic equations | | | | | | |
| | 2.3 | Operations on matrix<br>Crating rows and columns Matrix<br>Matrix operations | | | | | | |
| | 2.4 | Finding transpose, determinant and inverse Solving matrix | | | | | | |
| | 2.5 | Arrays and vectors<br>(Column vectors, Row vectors) | | | | | | |
| 3 | | **MATLAB Simulink** | 10 | 18 | CO3 | 20% | 20% | 60% |
| | 3.1 | Introduction of Simulink<br>Simulink Environment & Interface | | | | | | |
| | 3.2 | Study of Library<br>Circuit Oriented Design<br>Equation Oriented Design | | | | | | |
| | 3.3 | Model<br>Subsystem Design<br>Connect Call back to subsystem | | | | | | |
| | 3.4 | Application of Simulink | | | | | | |
| **SECTION II** | | | | | | | | |
| 4 | | **Introduction to python** | 4 | 8 | CO1 | 40% | 60% | - |
| | 4.1 | Installation and Working with Python | | | | | | |
| | 4.2 | Understanding Python variables | | | | | | |
| | 4.3 | Python basic Operators | | | | | | |
| | 4.4 | Understanding python blocks | | | | | | |
| 5 | | **Python Data Types** | 10 | 12 | CO2 | 40% | 40% | 20% |
| | 5.1 | Declaring and using Numeric data types: int, float, complex | | | | | | |
| | 5.2 | Using string data type and string operations | | | | | | |
| | 5.3 | Defining list and list slicing, Use of Tuple data type | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 | | Python Program and Flow Control | 10 | 20 | CO3 | 20% | 40% | 40% |
| | 6.1 | Conditional blocks using if, else, elif Nested if & Switch Case Statement | | | | | | |
| | 6.2 | Simple for loops in python | | | | | | |
| | 6.3 | For loop using ranges, string, list and dictionaries | | | | | | |
| | 6.4 | Use of while loops in python | | | | | | |
| | 6.5 | Loop manipulation using pass, continue, break and else | | | | | | |
| | 6.6 | Programming using Python conditional and loops block | | | | | | |
| | | | **48** | **80** | | | | |

**Practical Course Outcomes:**

Student should be able

| | |
|---|---|
| CO1 | Get the knowledge of software. |
| CO2 | Debug and edit programs using different tools. |
| CO3 | Built logic for the given problem. |

**List of Practicals/Assignments/Tutorials:**

| Sr. No. | Unit | Practical/Assignment | Approx. Hours | CO |
|---|---|---|---|---|
| 1 | 1 | To study various windows of MATLAB. | 2 | CO1 |
| 2 | 1 | To display any character on the output window. | 2 | CO1 |
| 3 | 2 | To perform arithmetic and logical operations using MATLAB. | 2 | CO1 |
| 4 | 2 | To perform operations on Arrays and vectors | 2 | CO1 |
| 5 | 2 | To solve the equations using MATLAB. | 2 | CO2 |
| 6 | 3 | Built any model using simulink | 2 | CO3 |
| 7 | 4 | To study basic library and structure in python | 2 | CO2 |
| 8 | | Write a program to demonstrate string operation in python. | | |
| 9 | 4 | Write a program to perform if condition and nested if condition in python. | 2 | CO2 |
| 10 | 5 | Write a program related to else condition elif condition in python. | 2 | CO2 |
| 11 | 5 | Write a program related to switch condition case in python. | 2 | CO3 |

**NOTE: Mini project by using any tool (Matlab / python).**

Text Books:

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Andre Knoesen, \| Rajeevan Amirtharajah, | Introduction to MATLAB | zyBooks |
| 2 | James B. Dabney, Thomas L. Harman | Mastering Simulink | Prentice Hall |
| 3 | Mark Lutz and David Ascher | Learning Python | O'reilly |

**Reference Books:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Misza Kalechman | Practiacal MATLAB basics for Engineers | CRC press |
| 2 | Eric Matthes | Python Crash Course | No starch press |
| 3 | second edition of John Zelle's Python Programming | Python Programming: An Introduction To Computer Science | |

**Website:**

1. www.mathworks.com
2. https://nptel.ac.in/courses/117106113/34

| Curriculum Coordinator | Head Diploma | Dean - Diploma |
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RAMNATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA, MUMBAI-19.

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|---|---|
| COURSE NAME | **:DIPLOMA IN ELECTRONICS ENGINEERING** |
| COURSE CODE | **:DELNE** |
| SEMESTER | **:SIXTH** |
| SUBJECT TITLE | **:Management principles** |
| SUBJECT CODE | **:173EX65** |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 3 | 2 | - | 5 | 3 | 80 | 32 | 20 | 100 | 40 | - | - | - | - | 25 | 10 | 125 |

**Course 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

**Course Outcomes:**

**Students will be able to :**

| | |
|---|---|
| CO1 | Understand the interaction between engineering, business and management |
| CO2 | Analyse the method of performance appraisal and find the best out of them |
| CO3 | Understand the basics of material management. |
| CO4 | Understand the importance of safety in industries. |

Course Content:

| SECTION-I | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 1 | | **Principles of Management** | 10 | 16 | CO1 | 40% | 40% | 20% |
| | 1.1 | Management: Definition, functions, levels, skills. | | | | | | |
| | 1.2 | Planning: Process, merits, limitations. | | | | | | |
| | 1.3 | Decision making: Decision making models, group decision making | | | | | | |
| | 1.4 | Organizing: Span of management, delegation of authority, decentralization of authority, departmentation. | | | | | | |
| 2 | | **Process of Management** | 14 | 24 | CO2 | 40% | 40% | 20% |
| | 2.1 | Communication: Upward, downward, formal and informal communication. Barriers to effective communication and ways to overcome them. | | | | | | |
| | 2.2 | Motivation: Maslow's and Herzberg's theories. Incentives. | | | | | | |
| | 2.3 | Leadership: Autocratic and democratic styles, Situational leadership. Leadership continuum and managerial grid. | | | | | | |
| | 2.4 | Controlling: Controlling process. Requirements of a good control system. | | | | | | |
| **SECTION II** | | | | | | | | |
| 3 | | **Materials Management** | 12 | 20 | CO3 | 45% | 45% | 10% |
| | 3.1 | Inventory Concept, its classification, functions of inventory | | | | | | |
| | 3.2 | Inventory Concept, its classification, functions of inventory | | | | | | |
| | 3.3 | Economic Order Quantity Concept, graphical representation, determination of EOQ | | | | | | |
| | 3.4 | Standard steps in Purchasing | | | | | | |
| 4 | | **Quality Management** | 12 | 20 | CO4 | 45% | 45% | 10% |
| | 4.1 | Meaning of Quality, Quality Management System, Activities, Benefits<br>Quality Control-Objectives, Functions, Advantages<br>Quality Circle-Concept, Characteristics & | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Objectives<br>Quality Assurance-Concept, Quality Assurance System | | | | | | |
| | 4.2 | Meaning of Total Quality and TQM Components of TQM - Concept, Elements of TQM, Benefits | | | | | | |
| | 4.3 | Modern Technique & Systems of Quality Management like Kaizen,5`S`,6 Sigma | | | | | | |
| | | **Total** | **48** | **80** | | | | |

**List of Practical/Assignments/Tutorials:**

| Assignments | Marks Assigned |
|---|---|
| Presentation on topics in syllabus | 5 marks |
| Individual Assignment | 5 marks |
| Case study related to topics discussed in class | 5 marks |
| group discussion on the given topics | 5 marks |
| One role play per group | 5 marks |

**Text Books:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Telsang M.T. | Industrial and Business Management, 2007 Edition, | S Chand Publisher |
| 2 | O.P. Khanna | Indusrial Engineering and Management | Dhanpat Rai Publication, 17th Edition, 2010 |

**Reference books and Websites:**

| Sr. No. | Author | Title | Publisher and Edition |
|---|---|---|---|
| 1 | Koontz | Essentials for Management: An International Perspective | Mhe Publisher 8th Edition |
| 2 | Dr P N Reddy, Prof H R Appannaiah,n Prof V Surendar, | Industrial Organisation and Management | Himalaya Publishers. 3rd Edition |

| | | | |
|---|---|---|---|
| 3 | S. D. Sharma | Operations Research | KedarNath Ram Nath publication, 15th Edition, 2005 |

**Website:**

1. **nptel.iitm.ac.in**
2. **http://iete-elan.ac.in/subjects/amIndustrialMgmt.html**

| Curriculum Coordinator | Head | Dean - Diploma |
|---|---|---|
| | Diploma | |

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|---|---|
| DIPLOMA PROGRAMME | : DIPLOMA IN ELECTRONICS ENGINEERING |
| PROGRAMME CODE | : DElnE |
| SEMESTER | : SIXTH |
| COURSE TITLE | :Institute Industry Interaction |
| COURSE CODE | : 173EX66 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| 2 | - | - | 2 | - | 2 | | - | - | - | - | - | - | - | 25 | 10 | 25 |

**Course Objectives:**

After studying this subject, students will be able to

1. Better interaction between Technical institutions and industry is the need of the hour. This will have great bearing on the Engineering Curriculum, exposure of industrial atmosphere to diploma students
2. With the advent of globalization and opening up of Indian economy to outside world, competition among industries have become stiff. To solve their engineering problems they look up now to engineering Institutions. Similarly, there is an urgent need to prepare engineering students for jobs in multinational companies, by exposing them to newer technologies and engineering methodologies. These objectives can only be achieved well by bridging the gap between industry and the academic institute.

**Course Content:**

1. Organizing Workshops, conferences with joint participation of the faculty and the industries.
2. Encouraging engineers from industry to visit Engineering Institution to deliver lectures.
3. Industrial testing.

4. Visits of industry executives and practicing engineers to the Institute for discussions and delivering lectures on industrial practices, trends and experiences.
5. Practical training of students in industries.
6. Scholarships/fellowships instituted by industries at the Institute for students.
7. Guidance to student for technical paper writing.
8. Human resource development programmes by the faculty for practising engineers.
9. Short-term assignment to students in industries.

**NOTE: Student should prepare report on the each topic covered by experts the marks will be given based on the report.**

| Curriculum Coordinator | Head Diploma | Dean - Diploma |
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|---|---|
| DIPLOMA PROGRAMME | : DIPLOMA IN ELECTRONICS ENGINEERING |
| PROGRAMME CODE | : DElnE |
| SEMESTER | : SIXTH |
| COURSE TITLE | : PROJECT II |
| COURSE CODE | : 173EX67 |

**TEACHING AND EXAMINATION SCHEME:**

| TEACHING SCHEME | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | T | P | CR | PAPER HRS | TH | | IST | TOTAL | | PR | | OR | | TW | | TOTAL MARKS |
| | | | | | Max | Min | | Max | Min | Max | Min | Max | Min | Max | Min | |
| - | - | 4 | 4 | - | - | - | - | - | - | - | - | 50 | 20 | 100 | 40 | 150 |

**Course Objectives:**

After studying this subject, students will be able to

1. Analyze the different types of Case Studies and develop innovative ideas.
2. Work in Groups, Plan the work, and Coordinate the work.
3. Develop basic technical skills by hands on experience.
4. Write project report.
5. Develop skills to use latest technology in Electronics and related inter disciplinary field.

**Course Contents:**

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

1. Form project groups (Five students per batch).
2. Each project group should select topic/ problem/ work by consulting the respective Supervisor.
3. The selected Topic/ Problem/ Work should be approved by Head of Department.
4. Each project group should prepare action plan of project activities & submit the same to respective Supervisor.

5. At the end of semester, each project batch should submit the prepared action plan and abstract of the Report along with list of materials required.
6. If any project group get funding from the industry for implementation of their idea they can allowed for the industrial project with prior permission.
7. 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:**

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

| Curriculum Coordinator | Head | Dean - Diploma |
|---|---|---|
| | Diploma | |