DEC-301   ANALOG ELECTRONICS - II

```
L  T  P
4  -  2
```

RATIONALE

Having attained basic knowledge of electronic devices like diodes, transistors, and elementary circuits, in second semester, this course will enable the students to learn about the use of transistors in analog circuits like power amplifier, multistage amplifier, oscillators, wave shaping circuits and in multivibrators etc. It also gives information about timer, operational amplifier, voltage regulator, ICs and their applications for effective functioning in the field of electronic service industry.

DETAILED CONTENTS

1. **Multistage Amplifiers**   (08 hrs)

   a) Need for multistage amplifier
   b) Gain of multistage amplifier
   c) Different types of multistage amplifier like RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth

2. **Large Signal Amplifier**   (08 hrs)

   a) Difference between voltage and power amplifiers
   b) Importance of impedance matching in amplifiers
   c) Class A, Class B, Class AB, and Class C amplifiers
   d) Single ended power amplifiers, push-pull amplifier, and complementary symmetry push-pull amplifier

3. **Feedback in Amplifiers**   (08 hrs)

   a) Basic principles and types of feedback
   b) Derivation of expression for gain of an amplifier employing feedback
   c) Effect of feedback (negative) on gain, stability, distortion and bandwidth of an amplifier
   d) RC coupled amplifier with emitter bypass capacitor
   e) Emitter follower amplifier and its applications

4. Sinusoidal Oscillators (08 hrs)

a) Use of positive feedback
b) Barkhausen criterion for oscillations
c) Different oscillator circuits-tuned collector, Hartley Colpitts, phase shift, Wien's bridge, and crystal oscillator. Their working principles and simple numerical problems
d) Series and parallel resonant circuits and bandwidth of resonant circuits
e) Single and double tuned voltage amplifiers and their frequency response characteristics

6. Wave Shaping Circuits (04 hrs)

a) General idea about different wave shapers
b) RC and RL integrating and differentiating circuits with their applications
c) Diode clipping and clamping circuits and simple numerical problem on the circuits

7. Multivibration Circuits (08 hrs)

a) working principle of transistor as switch
b) Concept of multi-vibrator: astable, monostable, and bistable and their applications
c) Block diagram of IC555 and its working
d) IC555 as monostable and astable multi-vibrator

8. Operational Amplifiers (06 hrs)

a) Characteristics of an ideal operational amplifier and its block diagram
b) Definition of differential voltage gain, CMMR, PSRR, slew rate and input offset current
c) Operational amplifier as an inverter, scale changer, adder, subtractor, differentiator, and integrator
d) Concept of Schmitt trigger circuit and sample/hold circuit using operational amplifier and their applications

9. Regulated DC Power Supplies (06 hrs)

a) Concept of DC power supply. Line and load regulation

b) Concept of fixed voltage, IC regulators (like 7805, 7905), and variable voltage regulator like (IC 723)
c) Idea of SMPS

DEC-307   ANALOG ELECTRONICS – II LAB

LIST OF PRACTICALS

1. Plot the frequency response of two stage RC coupled amplifier and calculate the bandwidth and compare it with single stage amplifier

2. To measure the gain of push-pull amplifier at 1KHz

3. To measure the voltage gain of emitter follower circuit and plot its frequency response

4. Plot the frequency response curve of Hartley and Colpitts Oscillator

5. Plot the frequency response curve of phase shift and Wein bridge Oscillator

6. To observe the output waveforms of series and shunt clipping circuits

7. To observe the output for clamping circuits

8. To observe the output waveform of a Bistable multivibrator

9. Use of IC 555 as monostable multivibrator and observe the output for different values of RC

10. Use of IC 555 as astable multivibrator and observe the output at different duty cycles

11. To use IC 741 (op-amplifier) as

    i)   Inverter
    ii)   Adder
    iii) Subtracter
    iv)   Integrator

12. To realize positive and negative fixed voltage AC power supply using three terminal voltage regulator IC (7805, 7812, 7905)

RECOMMENDED BOOKS

1. Basic Electronics and Linear Circuits by NN Bhargava, Tata McGraw Hills, New Delhi

2. Electronics Principles by Malvino, Tata McGraw Hills, New Delhi

3. Electronic Devices and Circuits by Millman and Halkias, McGraw Hills, New Delhi

4. Basic Electronics by Grob, Tata McGraw Hills, New Delhi

5. Art of Electronics by Horowitz

6. Electronic Principles by Sahdev, Dhanpat Rai and Sons, New Delhi.

7. Electronic Circuit Theory by Boylstead

8. Electronic Devices and Circuits by BL Theraja, S Chand and Co Ltd. New Delhi

9. Operational Amplifiers and Linear Integrated Circuits by Ramakant A. Gaykwad

10. Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi

11. Electronics Devices and Circuits-II by Naresh Gupta, Jyotesh Malhotra and Harish C. Saini, Eagle Prakashan, Jalandhar

DEC-302 ELECTRONIC COMPONENTS AND MATERIALS (ECM)

L   T   P
4   -   -

RATIONALE

Study of Electronic components and Materials is important from point of view of manufacturing, testing and maintenance of electronic devices and systems.   Students should understand the procedure of identification, characteristics, specifications, merits, limitations, and applications of electronic components and materials.

DETAILED CONTENTS

1. **Materials**   **(32 hrs)**

1.1   Classification of materials   (4 hrs)
Conducting, semi-conducting and insulating materials through a brief reference to their atomic structure.

1.2   Conducting Materials   (10 hrs)
Resistors and factors affecting resistivity such as temperature, alloying and mechanical stressing. Classification of conducting materials into low resistivity and high resistivity materials.

1.3   Insulating Materials   (10 hrs)
Important relevant characteristics (electrical, mechanical and thermal) and applications of the following material:

Mica, Glass, Copper, Sliver, PVC, Silicon, Rubber, Bakelite, Cotton, Ceramic, Polyester, Polythene and Varnish.

1.4   Magnetic Materials   (8 hrs)
Different Magnetic materials; (Dia, Para, Ferro) and their properties. Ferro magnetism, Domains, permeability, Hysteresis loop. Soft and hard magnetic materials, their examples and typical applications.

2. **Components**   **(32 hrs)**

2.1   Capacitors   (8 hrs)

a)   Concept of capacitance and capacitors, units of capacitance, types of capacitors, constructional details and testing specifications
b)   Capacity of parallel plate capacitors, spherical capacitors, cylindrical capacitor.
c)   Energy stored in a capacitor.

d) Concept of di-electric and its effects on capacitance, di-electric constant, break down voltage.

e) Series and parallel combination of capacitor. Simple numerical problems of capacitor.

f) Charging and discharging of capacitor with different resistances in circuit, concept of current growth and decay, time constant in R-C circuits, simple problems.

2.2 Resistors: Carbon film, metal film, carbon composition, wound and variable types (presets and potentio-meters) (3 hrs)

2.3 Transformer, inductors and RF coils: (4 hrs)
Methods of manufacture, testing, Need of shielding, application and trouble shooting

2,4 Surface Mounted Devices (SMDs): (4 hrs)
Constructional detail and specifications.

2.5 Connectors, Relays, switches and cables: (5 hrs)
Different types of connectors, relays, switches and cables, their symbols, construction and characteristics.

2.7 Semi Conductors and Integrated Circuits (8 hrs)

- Basic characteristics of Semiconductor materials, testing of diodes, transistors, FETs and SCRs.

- Various processes in IC manufacturing. Hybrid IC technology.

- Superconductivity and piezoelectric ceramic transducer elements

RECOMMENDED BOOKS

1. Electronic components and Materials by Grover and Jamwal; Dhanpat Rai and Sons, New Delhi

2. Basic Electronics and Linear Circuits by NN Bhargava and Kulshreshta; Tata McGraw Hill, New Delhi

3. Electronic components and Materials by SM Dhir, Tata McGraw Hill, New Delhi

4. Electrical and Electronic Engineering Materials by SK Bhattacharya, Khanna Publishers, New Delhi

5. Electronic Engineering Materials by ML Gupta, Dhanpat Rai and Sons; New Delhi.

DEC-303   PRINCIPLES OF COMMUNICATION

L T P
4 - 2

RATIONALE

In the present age of information technology, the communication gains utmost importance whether it be voice or data or control signal. The students will be able to understand the working principle of various communication devices used in industry after going through the basic principles and concepts contained in this subject.

DETAILED CONTENTS

1. **Introduction**   (03 hrs)

   a) Need for modulation and demodulation in communication system
   b) Basic schemes of modern communication system

2. **Amplitude Modulation**   (08 hrs)

   a) Definition, derivation of expression for an A.M., wave carrier and side band component modulation index, relative power distribution in carrier and side bands
   b) Basic idea of DSB, DSB-SC, SSB-SC, ISB and VSB modulation and their comparison and area of application

3. **Frequency Modulation**   (07 hrs)

   a) Expression for frequency modulated wave and frequency spectrum (without proof and analysis of Bessel function), modulation index, maximum frequency deviation and deviation rating
   b) Effect of noise on FM carrier, Noise triangle. Need for pre-emphasis and de-emphasis
   c) Narrow band and wide band FM
   d) Comparison of FM and AM in communication system

4. **Principles of AM Modulator**   (04 hrs)

   Working principles and typical applications of:

a) Collector modulator
b) Base modulator
c) Balanced modulator

5. **Principles of FM Modulator** (06 hrs)

Working principle, applications of reactance modulator, varactor diode modulator, VCO and armstrong phase modulator, stabilization of carrier for using AFC (block diagram approach)

6. **Demodulation of FM Wave** (07 hrs)

a) Basic principle of FM detection using single slope and dual slope detector
b) Principle of working of following FM demodulator
   - Foster-seeley discriminator
   - Ratio detector
   - Quadrature detector
   - Phase locked loop, PLL FM demodulator

7. **Phase Modulation** (03 hrs)

Definition derivation of expression for PM wave modulation index. Comparison with FM

8. **Pulse Analog Modulation (PAM, PAW, PPM)** (05 hrs)

Sampling theorem (basic idea only), basic idea of pulse amplitude modulation (PAM), pulse width modulation (PWM) and pulse position modulation (only block diagram approach). Basic concept of TDM and FDM

9. Concept of Spread Spectrum, frequency hopping and direct sequence spread (05 hrs)
spectrum, CDMA and generation of spreading sequences Advantages of CDMA

DEC-308 COMMUNICATION LAB

LIST OF PRACTICALS

1. To obtain AM waveform from a modulator circuits

2. To measure modulation index of AM signal for different level of modulating signal

3. To obtain a FM wave from reactance tube modulator/voltage controlled oscillator circuit and obtain time constant and obtain its optimal value for least distortion

4. To obtain modulating signal from FM detector (foster seeley/ratio detector) circuits and plot the discriminator characteristics

5. a) To generate PAM signal by modulating with audio signal generator
   b) To demodulate PAM using low pass filter

6. a) To generate PWM signal by modulating with audio signal generator
   b) To demodulate PWM using comparator and low pass filter

7. To generate PPM signal by modulating with audio signal and generator

RECOMMENDED BOOKS

1. Electronics Communication by Kennedy, Tata McGraw Hill, New Delhi

2. Electronics Communication by KS Jamwal, Dhanpat Rai & Sons, New Delhi

3. Radio Engineering by GK Mittal, Khanna Publishers, New Delhi

4. Principles of Communication Engineering by DR Arora, Ishan Publications, Ambala

5. Communication Engineering by A Kumar

6. Principles of Communication Engineering by Manoj Kumar, Satya Prakashan, New Delhi

7. Principles of Communication Engineering by Anokh Singh, S.Chand & Co., New Delhi

DEC-304   DIGITAL ELECTRONICS - I

L T P
4 - 2

RATIONALE

The objective of this subject is to enable the students to know the basic concepts of digital electronics and gain familiarity with the available IC chips. The students will learn about number systems, logic gates, various codes, parities, Boolean algebra, mux and demux, filp-flop, counters, shift registers. This will form a broad base for studying digital system design, advanced microprocessors and further studies.

DETAILED CONTENT

1. **Introduction**   (01 hrs)

    a) Define digital and analog signals and systems, difference between analog and digital signals
    b) Need of digitization and applications of digital systems

2. **Number Systems**   (10 hrs)

    a) Decimal, binary, octal, hexadecimal number systems
    b) Conversion of number from one number system to another including decimal points
    c) Binary addition, subtraction, multiplication, division, 1's and 2's complement method of subtraction
    d) BCD code numbers and their limitations, addition of BCD coded numbers, conversion of BCD to decimal and vice-versa
    e) Excess-3 code, gray code, binary to gray and gray to binary conversion
    f) Concept of parity, single and double parity, error detection and correction using parity

3. **Logic Gates**   (04 hrs)

    a) Logic gates, positive and negative logic, pulse waveform, definition, symbols, truth tables, pulsed operation of NOT, OR, AND, NAND, NOR, EX-OR, EX-NOR gates
    b) NAND and NOR as universal logic gates

4. Logic Simplification (08 hrs)

a) Rules and laws of Boolean algebra, logic expression, Demorgan's theorems, their proof

b) Sum of products form (minterm), Product of sum form (maxterms), simplification of Boolean expressions with the help of Rules and laws of Boolean algebra

c) Karnaugh mapping techniques upto 4 variables and their applications for simplification of Boolean expression

5. Arithmetic Circuits (03 hrs)

a) Half adder, full adder circuits and their operation

b) Parallel binary adder, 2-bit and 4-bit binary full adder, block diagram, working

6. Multiplexer/Demultiplexer (04 hrs)

a) Basic functions, symbols and logic diagrams of 4-inputs and 8-inputs multiplexers,

b) Function/utility of 16 and 32 inputs multiplexers,

c) Realization of Boolean expression using multiplexer/demultiplexers

7. Decoders, Display Devices and Associated Circuits (04 hrs)

a) Basic Binary decoder, 4-line to 16 line decoder circuit

b) BCD to decimal decoder, BCD to 7-segment decoder/driver, LED/LCD display

8. Encoders and Comparators (04 hrs)

a) Encoder, decimal to BCD encoder, decimal to BCD priority encoder, keyboard encoder

b) Magnitude comparators, symbols and logic diagrams of 2-bit and 4-bit comparators

9. Latches and Flip-Flops (08 hrs)

a) Latch, SR-latch, D-latch, Flip-flop, difference between latch and flip-flop

b) S-R, D flip-flop their operation using waveform and truth tables, race around condition

c) JK flip-flop, master slave and their operation using waveform and truth tables

10. **Counters**   (10 hrs)

   a) Asynchronous counter, 4-bit Asynchronous counter, Asynchronous decade counter

   b) Asynchronous counter, 4-bit synchronous binary counter, Asynchronous decade counter

   c) Up/down Asynchronous counters, divide by N counter MOD-3, MOD-5, MOD-7, MOD-12 counters

   d) Ring counter, cascaded counter, counter applications

11. **Shift Registers**   (08 hrs)

   a) Shift registers functions, serial-in-serial out, serial-in-parallel-out, parallel-in-serial-out, parallel-in-parallel out

   b) Universal shift register, shift register counter and applications of shift registers

DEC-309   DIGITAL ELECTRONICS – I LAB

LIST OF PRACTICALS

1. Study of logic breadboard with verification of truth table for AND, OR, NOT, NAND, EX-OR, NOR gate

2. Verification of NAND and NOR gate as universal gates

3. Construction of half-adder and full adder circuits using EX-OR and NAND gate and verification of their operation

4. Verify the operation of
    a) multiplexer using an IC
    b) de-multiplexer using an IC

5. a) Verify the operation of BCD to decimal decoder using an IC

    b) Verify the operation of BCD to 7 segment decoder using an IC

6. Verify operation of SR, JK, D-flip-flop master slave JK filp-flop using IC

7. Verify operation of SISO, PISO, SIPO, PIPO shift register. (universal shift register)

8. Study of ring counter, Up/down counter

9. Construct and verify the operation of an asynchronous binary decade counter using JK flip-flop

10. Verification of truth tables and study the operation of tristate buffer IC 74126 or similar IC and construction of 4/8 bit bi-directional bus by using an IC

11. Testing of digital ICs using IC tester

RECOMMENDED BOOKS

1. Digital Electronics and Applications by Malvino Leach, Tata McGral Hill, New Delhi

2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi

3. Digital Fundamentals by Thomas Floyds, Universal Book Stall

4. Digital Electronics by RP Jain, Tata McGraw Hill, New Delhi

5. Digital Electronics by KS Jamwal, Dhanpat Rai & Co., New Delhi

6. Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala

7. Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi

8. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi

9. Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi

DEC-305   ELECTRICAL MACHINES

L T P
4 - 0

RATIONALE

This is a subject dealing with various types of electrical machines being employed in industries, power stations, domestic and commercial appliances etc. It is envisaged that after studying the subject, students will gain competence in operation, repair and maintenance of such machines and give suggestions for improvement in their performance. The practicals will enable students to perform various tests necessary for installation and commissioning of such machines.

DETAILED CONTENT

1. **Three Phase Supply**   (03 hrs)

   a) Advantages of 3 phase system over single phase system
   b) Star delta connections
   c) Relation between phase voltage and line voltage, also between phase current and line current in a 3 phase system
   d) Power and power factor in 3 phase system and their measurements

2. **Transformer**   (05 hrs)

   Principles of transformer, construction, voltage and current transformation. Methods of connection 3 phase transformers, current and voltage relationship, auto transformer and its uses, instruments transformer, voltage regulation and its significance, need for isolation, electrical and transients suppression, principles of isolation transformer, specifications of all types of transformers. Losses in a transformer

3. **DC Motor**   (08 hrs)

   Principles, significance of back emf, types of motors and their constructions, motor characteristics for shunt and series, speed control of DC motors and factors controlling the speed. Starting methods, Construction and working of 3 point starter, applications (simple problems)

4. **3 Phase Induction Motors**   (08 hrs)

   Principles, construction, concept of slip, torque and characteristics, effect of

motor resistance on torque (running and starting), rotor current, output power, different methods of speed control. Starting methods and constructional and working of 3 point starter, applications (simple problems)

5. **Synchronous Motors** (06 hrs)

Principles, constructions and working, effect of load and excitation on synchronous motor. Starting of motor and their applications

6. **Single Phase Motors** (06 hrs)

Principles, construction, working speed control, starting and applications of the following motors:

a) Induction motor
c) Universal motor

7. **Stepper Motor and Servo Motor** (06 hrs)

Types, construction, working and their applications

(**Note**: No derivation of any formula)

LIST OF PRACTICALS

1. Introduction to electrical machines

   Measurement of the angular displacement of rotor of the three phase synchronous machine with respect to the stator on application of DC to the field winding and simultaneously to each phase-winding in sequence

   OR

   Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator winding in sequence and simultaneously to each phase of rotor winding

2. DC machines

   2.1 Speed control of dc shunt motor (i) Armature control method (ii) Field control method

2.2   Study of dc series motor with starter (to operate the motor on no load for a moment)

3.   Transformers (single phase)

3.1   To perform open circuit and short circuit test for determining parameter of a transformer

3.2   To determine the regulation and efficiency from the data obtained from open circuit and short circuit test

4.   Three-phase transformers

4.1   Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations

4.2   Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions

RECOMMENDED BOOKS

1.   Electrical Machine by SK Bhattacharya, Tata Mc Graw Hill, New Delhi

2.   Electrical Machines by SK Sahdev, Unique International Publications, Jalandhar

3.   Electrical Machines by Nagrath and Kothari, Tata Mc Graw Hill, New Delhi

DEC-306   ELECTRONIC INSTRUMENTS AND MEASUREMENT

L   T   P
4   -   2

RATIONALE

In the real world of work the technician is required to handle wide variety of instruments while testing, trouble shooting, calibration etc. the study of this subject will help students to gain the knowledge of working principles and operation of different instruments. During practical sessions, he will acquire the requisite skills.

DETAILED CONTENTS

1. **Basics of Measurements**   (04 hrs)

   Measurement, method of measurement, types of instruments

   Specifications of instruments: Accuracy, precision, sensitivity, resolution, range, errors in measurement, sources of errors, limiting errors loading effect, requirements, importance and applications of standards, calibration

2. **Multimeter**   (08 hrs)

   Principles of measurement of DC voltage, DC current, AC voltage, AC current, moving coil and moving iron type instruments (voltmeter and Ammeter)

   Block diagram of multimeter and measurement of voltage, current and resistance using multimeter

   Specifications of multimeter and their applications

   Limitations with regard to frequency and input impedance

3. **Electronic Voltmeter**   (06 hrs)

   Advantages over conventional multimeter for volt measurement with respect to input impedance and sensitivity

   Principles of voltage, current and resistance measurement (block diagram only)
   Specifications of electronics voltmeter

4.   **AC Milli Voltmeter**   (04 hrs)

Types of AC milli voltmeters and their block diagram description
Typical specifications and their significance

5.   **Cathode Ray Oscilloscope**   (05 hrs)

Construction and working of different blocks used in CRT
Time base operation and need for blanking during flyback, synchronization
Block diagram description of a basic CRO and triggered sweep oscilloscope, front panel controls
Specifications of CRO and their explanation
Measurement of current, voltage, frequency, time period and phase using CRO
CRO probes, special features of dual beam, dual trace,delay sweep
Digital storage oscilloscope: block diagram and working principle

6.   **Signal Generators and Analysis Instruments**   (06 hrs)

Explanation of block diagram specifications of low frequency and RF generators, pulse generator, function generator
Distortion factor meter; wave analyser and spectrum analyser

7.   **Impedance Bridges and Q Meters**   (12 hrs)

Wheat stone bridge
AC bridges: Maxwell's induction bridge, Hay's bridge, De-Sauty's bridge, Schering bridge and Anderson bridge
Block diagram description of laboratory type RLC bridge, specifications of RLC bridge
Block diagram and working principle of Q meter

8.   **Digital Instruments**   (08 hrs)

Comparison of analog and digital instruments
Working principle of ramp, dual slope and integration type digital voltmeter
Block diagram and working of a digital multimeter
Measurement of time interval, time period and frequency using universal counter/frequency counter
Working principle of logic probe, logic pulser, logic analyzer, logic comparator, signature analyzer and logic analyzer

DEC-310 ELECTRONIC INSTRUMENTS AND MEASUREMENT LAB

LIST OF PRACTICALS

1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance

2. To observe the limitations of a multimeter for measuring high frequency voltage

3. Measurement of voltage, frequency, time period and phase using CRO

4. Measurement of rise time and fall time using CRO

5. Measurement of Q of a coil and its dependence on frequency

6. Measurement of voltage, frequency, time and phase using DSO

7. Measurement of resistance and inductance of coil using RLC meter

8. Measurement of distortion of RF signal generator using distortion factor meter

9. Use of logic pulser and logic probe

10. Measurement of time period, frequency, average period using universal counter/ frequency counter

11. Study of operation and features of a logic analyser

RECOMMENDED BOOKS

1. Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai & Sons, Delhi

2. Electronics Instrumentation by Cooper, Prentice Hall of India

3. Electronics Test and Instrumentation by Rajiv Sapra, Ishan Publications, Ambala

4. Electronics Instrumentation by JB Gupta, Satya Prakashan, New Delhi

DEC-401   NETWORK, FILTERS AND TRANSMISSION LINES

L   T   P
4   -   -

RATIONALE

The study of network, filters and transmission lines leads to understanding of line communication, audio and video communication and micro wave communication. Particularly the study of network from principles of AC theory, introduces the students to parameters and characteristics of various networks, including filters. Also the study of transmission lines becomes important as its analogy is used in study of transmission of plane electromagnetic waves in bounded media.

DETAILED CONTENT

1. **Networks**   (12 hrs)
    a) Two Port (Four Terminal) Network
       - Two port parameters (impedance, admittance, transmission, hybrid parameters)
       - Interconnection of two ports (series connection, parallel connection, cascade connection
       - Equivalent networks
       - T-network, Pi-networks, ladder networks
       - Symmetrical and asymmetrical networks
    b) Symmetrical Network
       - Concept and significance of characteristic impedance, propagation constant, attenuation constant (with expression in terms of Zo, Zoc for T-network, Pi-network
    c) Asymmetrical Network
       - Concept and significance of iterative impedance, image impedance, image transfer constant and insertion loss
       - Half section (L-section), symmetrical T and Pi section into half section

2. **Network Theorem**   (08 hrs)
    A brief study of following:
       - Tellegen's Theorem
       - Superposition theorem
       - Substitution theorem
       - Thevenin and norton theorem
       - Reciprocity – maximum power transfer theorem
       - Attenuators: brief idea about attenuators and its types

3. **Filters** (16 hrs)

a) - Applications of filters in communication system
   - Concept of low pass, high pass, band pass, band stop, butter worth filter, constant filters, m-derived filters, K-filters

b) Proto-type Filter Section
   - Reactance vs attenuation constant and characteristic of a low pass filter and its impedance
   - Attenuation vs frequency, phase shift vs frequency characteristics Impedance vs frequency of T and Pi curve and their significance

c) M-derrived Filter Section
   - Need of M-derived filters
   - Expression for m in terms of fc (cut off frequency) fw (Frequency at which attenuation is infinity) for low pass and high pass filter

d) Active Filters
   - Basic concept and comparison with passive filters
   - Simple problems onlow pass and high pass filters (first and second order)

4. **Transmission Lines** (26 hrs)

a) Transmission lines and their implications, shapes of different types of transmission lines, (including 300 ohms antenna feeder cable, 75 ohm co-axial cable)

b) Distributed (or primary) constant of a transmission line, equivalent circuit of an infinite line, T and Pi type representation of a section of transmission line

c) Definition of characteristics impedance line: concept of short line termination in Zo; currents and voltage along at infinite line, propagation constant attenuation and phase shift constant of the line

d) Relationship of characteristics impedance, propagation constant attenuation constant and phase constant in terms of distributed constants of the lines.

e) Conditions for minimum distortion and minimum attenuation signal on the line; necessity and different methods of loading the communication lines (no derivation)

f) Concept of reflection and standing waves on a transmission lines; definition of reflection coefficient in terms of characteristic impedance and load impedance, definition of standing wave ratio (SWR). Relation between VSWR and voltage reflection coefficient maximum impedance and VSWR

g) Transmission line equation; expressions for voltage current and impedance at a point on the line for lines with and without losses

h) Input impedance of an open and short circuited line and its graphical representation

i) Transmission Line. at high frequency, effect of high frequencies on the

losses of a transmission line; application of Transmission Line as a reactive component and impedance transformer (e.f. quarter wave transformer)

j) Principle of impedance matching using single stub; comparison of open and short circuited stubs

Note: No derivation of any formula

RECOMMENDED BOOKS

1. Network Lines and Fields by John D Ryder; PHI, New Delhi
2. Network Filters and Transmission Lines by AK Chakarvorty; Dhanpat Rai & Co. Publication
3. Network Analysis by Van Valkenbury: PHI, New Delhi
4. Network Analysis by Soni and Gupta; Dhanpat Rai & Co. Publication
5. Network Theory and Filter Design by Vasudev K. Aatre

DEC-402   COMMUNICATION ENGINEERING - I

L T P
4 - 2

RATIONALE

Study of principles of communication systems leads to further study of audio and video systems, line communication and microwave communication systems. Thus the diploma holders shall find employment in areas of R&D, production, servicing and maintenance of various communication systems.

DETAILED CONTENT

1. **AM/FM Transmitters**   (08 hrs)

   a) Classification of transmitters on the basis of power and frequency
   b) Concept of low level and high level modulation, Block diagram of low and high level modulation, AM Transmitters and working of each stage.
   c) Block diagram and working principles of reactance transmiter and Armstrong FM transmitters.

2. **AM / FM Radio Receivers**   (16 hrs)

   a) Brief description of crystal and TRF receiver
   b)   Block diagram and working principle of super hetrodyne AM receiver, function of each block and typical wave   at I/P and O/P of each block Advantages of super heterodyne reception.
   c)   Performance characteristics of a radio receiver - sensitivity, selectivity, fidelity, S/N ratio, image rejection ration and their measurement procedure.
   d)   Selection criteria for intermediate frequency (IF), Concepts of simple and delayed AGC.
   e)   Block diagram of an FM receiver, function of each block and wave forms at input and output of different blocks. Need for limiting and de-emphasis in FM reception.
   f)   Block diagram of communication receivers, differences with respect to broadcast receivers.

3. **Antennas**   (16 hrs)

   a)   Physical concept of radiation of electromagnetic energy from a dipole, Concept of polarization of EM waves, electromagnetic spectrum and its various ranges: VLF, LF, HF, VHF, UHF, Micro-wave

b)   Definition and physical concepts of the terms used with antennas like point source, gain, directivity, aperture, effective area, radiation pattern, beam angle, beam width and radiation resistance.

c)   Types of antennas : brief description, characteristics and typical applications of
-      half wave dipole
-      medium wave (mast) antenna
   -    yagi and ferrite rod antenna

d)   Brief description of broadside and end fire arrays, their radiation pattern and applications (without analysis); brief idea about rhombic antenna and disc antenna.

4. **Propagation**   (16 hrs)

a)   Basic idea about different modes of radio wave propagation, ground wave propagation, space wave communication and sky wave propagation and troposcatter (duct propagation their characteristics and typical areas of applications (e.g. medium wave, short wave, radio and TV communication etc.)

b)   Basic idea of field strength in case of ground wave propagation and space wave propagation

c)   Explanation of terms – critical frequency, maximum usable frequency (MUF) and skip distance

d)   Noise in Radio communication, signal fading

DEC-407   COMMUNICATION ENGINEERING – I LAB

LIST OF PRACTICALS

1.   To plot the sensitivity characteristics of a radio receiver and determine the frequency of maximum sensitivity

2.   To plot the selectivity characteristics of a radio receiver

3.   To align AM broadcast radio receiver

4.   To study the faults in radio receiver

5.   To measure the DC/AC voltage at different points of a radio receiver

6.   Installation of directional antenna for best reception

7.   Installation of dish antenna for best reception

RECOMMENDED BOOKS

1. Electronic Communication by Kennedy, Tata McGraw Hill Publishers, New Delhi

2. Electronic Communication System by Reddy & Coolen, Prentice Hall of India

3. Electronic Communication System by KS Jamwal, Dhanpat Rai & Sons, Delhi

DEC-403   COMPUTER PROGRAMMING AND APPLICATIONS

```
L  T  P
4  -  2
```

RATIONALE

Computers play a very vital role in present day life, more so, in the professional life of diploma engineers. With the extensive use of Information Technology in large number of areas, the diploma engineers should be well conversed with these environments. In order to enable the students to use the computers effectively in problem solving, this course offers the modern programming languages like C along with exposition to various engineering applications of computers.

DETAILED CONTENTS

1.   Information Storage and Retrieval

    1.1   Need for information storage and retrieval

    1.2   Creating data base file

    1.3   Querying database file on single and multiple keys

    1.4   Ordering the data on a selected key

    1.5   Programming a very simple application

2.   Programming in C

    2.1   Basic structure of C programs

    2.2   Executing a C program

    2.3   Constants, variables, and data types

    2.4   Operators and expressions

    2.5   Managing Input-Output operations like reading a character, writing a character, formatted input, formatted output through print, scan, getch, putch statements etc.

    2.6   Decision making and branching using IF ..... else, switch, go to statements

    2.7   Decision making and looping using do-while, and for statements

    2.8   Arrays - one dimensional and two dimensional

    2.9   File

3.   Computers Application Overview

     3.1   Commercial and business data processing application

     3.2   Engineering computation

     3.3   CAD, CAM, CAE, CAI

4.   Typical Applications:

Students will be required to make a small programme for analysis of circuits design in the area of Electronics and Communication Engineering.

Use of various software available in the field of Electronics and Communication Engineering.

DEC-408 COMPUTER PROGRAMMING AND APPLICATIONS LAB

LIST OF PRACTICALS

1.   Creating database.

2.   Querying the database.

3.   Report generation.

4.   Programming in dbase

5.   Use of spread sheets/Matlan/Mathematica/Eureka (or any other package) for engineering computers.

5.   Use of design packages (appropriate design packages may be selected depending upon the availability) on Estimating and Costing, Analysis of rates and other areas

7.   Use of and electrical engineering related CAI packages.

8.   Programming for DAS and control.

9.   Exercises on data acquisition.

10.   Exercises on control - on/off switch, and proportional control.

11.   Programming exercise on executing C program

12.   Programming exercise on editing C program

13. Programming exercise on defining variables and assigning values to variables.

14. Programming exercise on arithmetic and relational operators.

15. Programming exercise on arithmetic expressions and their evaluation.

16. Programming exercise on reading a character.

17. Programming exercise on writing a character.

18. Programming exercise on formatting input using print.

19. Programming exercise on formatting output using scan.

20. Programming exercise on simple if statement.

21. Programming exercise on IF .... else statement.

22. Programming exercise on switch statement.

23. Programming exercise on go to statement.

24. Programming exercise on do-while statement.

25. Programming exercise on for statement.

26. Programming exercise on one-dimensional arrays.

27. Programming exercise on two-dimensional arrays.

28. Exercises on
     -      Internet use/application
     -      Typical application on Electrical Engineering

RECOMMENDED BOOKS

1.   Programming in C by Sachaum Series, McGraw Hills
2.   Programming in C by Kerning Lan and Riechie Prentice Hall of India, New Delhi
3.   Programming in C by Balaguru Swamy, Tata McGraw Hill, New Delhi
4.   Let us C – Yashwant Kanetkar, BPB Publications, New Delhi
5.   Vijay Mukhi Series for C and C++
6.   Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi
6.   Programming in C by Kris A Jansa, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi
7.   Programming in C by BP Mahapatra, Khanna Publishers, New Delhi
8.   Elements of C by MH Lewin, Khanna Publishers, New Delhi

DEC-404   DIGITAL ELECTRONICS – II

L T P
4 - 2

RATIONALE

Digital design is a vital area in electronics with a lot of scope in industry and research. This subject involves conventional and sequential circuit designs both of which are very important fields. This subject forms the basis for research and development of digital systems. This subject will enable the students to learn concept of

DETAILED CONTENTS

1. **Logic Families**   (08 hrs)

   a)   Logic family classification. TTL, ECL, MOS, CMOS. Types of integration SSI,MSI, LSI, VLSI

   b)   Characteristics of TTL and CMOS and the comparison. Propagation delay. Speed, noise margin. Logic levels., power dissipation, fan-in, fan-out, power supply requirements

   c)   Open collector and totem pole output circuits, operation of a standard TTL, CMOS, NAND, NOR gates

   d)   CMOS to TTL interfacing and TTL to CMOS interfacing LAMP/LED interfacing

   e)   Introduction to tri-state devices tri-state buffer and invertor circuits. Examples of unidirectional and bi-directional bus with tri-state interfacing.

2. **A/D and D/A Converters**   (08 hrs)

   a)   DA Converters : Performance characteristics of D/A converters, binary resister network and resistance ladder network methods of D/A converters and applications

   b)   A/D Converters : Performance characteristics of A/D converters, single slope, dual slope, successive approximation and parallel A/D converters

3. **Memories**   (12 hrs)

   Memory organisation, classification of semi conductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory. CCD memories, content addressable memory, programmable logic devices, PROM at PLD, programmable logic array (PLA) programmable   array logic (PAL), field programmable gate array (FPGA), familiarization with common ICs.

4. **Combinational Circuits**   (08 hrs)

Minimisation of Boolean expressions using K-map method, tabular method of function minimization, Quine Mcclaaskey method

5. **Sequential Circuits**   (08 hrs)

Essential components of sequential circuit, synchronous and asynchronous sequential circuits, classification of sequential circuits (Meely and Moore Machine), design of counters using J-K and R-S flip-flops.

6. **Arithmetic and Logic Unit**   (04 hrs)

Basic idea about arithmetic logic unit w.r.t. IC 74181 and applications, implementation of binary multiplication, division, subtraction and addition

DEC-409   DIGITAL ELECTRONICS – II LAB

LIST OF PRACTICALS

1. Verify the operation of D/A converter

2. Verify the operation of A/D converter

3. Verify the writing and reading operation of RAM IC

4. Design J-K Flip-flop counter and verify its truth table

5. Familiarity with the use of EPROM programmes and UV index

6. Exercise on programming of EPROM

7. Using PLA design and implement a combinational circuit like full adder

8. Design and implement full adder and full subtractor

9. Verify the logical operation, arithmetic operation of binary numbers using IC741981

10. Design of combination circuit using ROM

RECOMMENDED BOOKS

1. Digital Systems and Applications by RJ Tocci, Prentice Hall of India, New Delhi

2. Digital Electronics by RP Jain, Tata McGraw Hill, New Delhi

3. Digital Electronics by KS Jamwal, Dhanpat Rai & Co., New Delhi

4. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi

5. Digital Designs by CJ Roth, Jaico Publication

6. Digital Designs by Z Kohavi

7. Digital Electronics by Terry LM Bartlet

8. Digital Electronics by Rajaraman V, Prentice Hall of India, New Delhi

9. Digital Fundamentals by Malvino and Leachy, Tata McGraw Hill Publishers, New Delhi

10. Digital Systems by Sanjay K Bose, Wiley Eastern (P) Ltd., New Delhi

DEC-405   MICROPROCESSORS AND APPLICATIONS

```
L  T  P
4  -  2
```

RATIONALE

The study of microprocessor in terms of architecture, software, and interfacing techniques lead to the understanding of working of CPU in a computer. Also study of peripherals like PPT, PIT, PIC etc. enables understanding and designing of small process control systems.

DETAILED CONTENTS

1.   **Introduction**   (04 hrs)

   Microprocessors – evolution, importance and Application

2.   **Architecture of a Microprocessor – 8085**   (16 hrs)

   a)   Concept of bus and bus organisation
   b)   Functional block diagram and function of each block
   c)   Pin details of 8085 and related signals
   d)   Demultiplexing of address/data bus and memory/IO read/write control signals

3.   **Introduction Set for Intel 8085**   (16 hrs)

   a)   Instruction and data format – opcode and operand and is word size
   b)   Instruction cycle, machine cycle, T-states, fetch cycle, and execute cycle
   c)   Different addressing modes
   d)   Status flags and their importance
   e)   Data transfer, arithmetic and logical operation, branding, and machine control instructions
   f)   Use of stacks and subroutines
   g)   Assembly language programming

4.   **Interfacing and Data Transfer Schemes**   (08 hrs)

   a)   Memory mapped I/O and I/O mapped I/O schemes
   b)   Interrupts of 8085
   c)   Programmable data transfer, DMA data transfer and interrupt driven data transfer schemes with their applications

5. **Peripheral Devices**   (12 hrs)
    Detailed study of the following
    a)   8255 PPI
    b)   8253 PIT
    c)   8257 DMA Controllers
    d)   8259 PIC
    e)   8279 Programmable KB/Display Interface
    f)   8251 Communication Interface Adapter

6. **Introduction to other** 8-bit microprocessor like Z-80, 6800 and their comparison   (08 hrs)
    with 8085

DEC-410   MICROPROCESSORS AND APPLICATIONS LAB

LIST OF PRACTICALS

1. Familiarisation of different keys of 8085 microprocessor kit and its memory map

2. Steps to enter, modify data/program and to execute a programme on 8085 kit

3. Writing and execution of ALP for addition and sub staction of two 8 bit numbers

4. Writing and execution of ALP for multiplication and division of two 8 bit numbers

5. Writing and execution of ALP for arranging 10 numbers in ascending/descending order

6. Writing and execution of ALP for 0 to 9 BCD counters (up/down counter according to choice stored in memory)

7. Interfacing exercise on 8255 like LED display control

8. Interfacing exercise on 8253 programmable interval timer

9. Interfacing exercise on 8279 programmable KB/display interface like to display the hex code of key pressed on display

10. Study and use of interfacing 8 bit A/D card

11. Study and use of interfacing 8 bit D/A card

12. Use of 8085 emulator for hardware testing

RECOMMENDED BOOKS

1. Microprocessor Architecture, Programming and Applications with 8085 by RS Gaonkar

2. Microprocessor and Applications by B Ram

3. Comprehensive Study of Microprocessor by Naresh Grover

4. Introduction to Microprocessor by Adithya P Mathur, Tata McGraw Hill Publishers, New Delhi

5. Microprocessor by SK Goel

6. 8051 by Mcakenzie, Prentice Hall of India, New Delhi

DEC-406   OPTICAL FIBER COMMUNICATION

L T P
4 - -

RATIONALE

Progressing from communication over copper wire to today's fibre optic communication, we have increased our ability to transmit more information , more quickly and over longer distances. This has expanded our boundaries and is finding a good slot in communication system. Optical fibers has replaced existing transmission media due to its advantages. As a result the technicians are supposed to have knowledge of optical communication. This subject will provide basic concepts and requisite knowledge and skill required.

DETAILED CONTENTS

1. **Introduction**   (08 hrs)

    Historical perspective, basic communication systems, optical frequency range, advantages of optical fibre communication, application of fibre optic communication
    Electromagnetic spectrum used, Advantages and disadvantages of optical communication.
    Principle of light penetration, reflection, critical angle.

2. **Optical Fibers and Cables**   (08 hrs)

    Fiber types construction, multimedia and monomode fibers, step index and graded index fibers, acceptance angle and acceptance types of optical fiber cables.

3. **Losses in optical fiber cable:**   (08 hrs)

    a)   Absorption Losses, Scattering Losses, Radiation losses, Compelling losses, Bending loses.
    b)   Dispersion, Material dispersion, wave guide dispersion, modal dispersion total dispersion and bit rate.

4. **Light sources and Detectors**

    a) Characteristics of light source used in optical communication, principle of operation of LED, different type of LED structures used and their brief description, LED driving circuitry, Injection Laser diode, principle of operation, different injection laser diodes, comparison of LED and ILD, non

semicon

ductor laser.   (08 hrs)

b) Characteristics of photo detectors used in optical communication; PIN diode and avalanche photo diode (APD), their brief description.

5. **Connectors, Splicing and coupling**

Fiber alignment and joint losses, splicing, types of splices, types of connectors used, couplers, three and four port coupler, stare coupler, fiber optic switch.

6. **Optical Fiber System**

Optical transmitter circuit, optical receiver circuit, optical power budgeting, multiplexing methods used. Modulation methods used**.**

RECOMMENDED BOOKS

1. Optical fiber Communication by John M Senior, Prentice Hall of India, New Delhi

2. Optical fiber Communication by J. Gower , Prentice Hall of India, New Delhi

3. Optical fiber Communication by ' Gerd Keiser, McGraw Hill International Editions

4. Optical Communications – Components and Systems by JH Franz and VK Jain, Narosa Publishing House, New Delhi

5. Optical fiber Communication Systems by GP Agrawal, John Wiley & Sons, New Delhi

6. Optical fiber Communication and its Applications by S C Gupta, Prentice Hall of India, New Delhi

DEC-501 CONSUMER ELECTRONICS

L T P
3 - 3

RATIONALE

The objective of teaching this subject is to give students an in depth knowledge of various electronic audio and video devices and systems. Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices like audio-systems, CD systems. TV, VCR and other items like digital clocks, calculators microwave ovens, photostat machines etc. Which in-turn will develop in them capabilities of assembling, fault diagnosis and rectification in a systematic way.

DETAILED CONTENTS

1. **Audio System**   (09 hrs)

1.1   Microphones: construction, working principles and applications of microphones, their types viz: a) Carbon b) moving coil, c) velocity, d) crystal, e) condenser, e) cordless etc.

1.2   Loud Speaker: Direct radiating, horn loaded woofer, tweeter, mid range, multi-speaker system, baffles and enclosures.

1.3   Sound recording on magnetic tape, its principles, block diagram, and tape transport mechanism

1.4   Digital sound recording on tape and disc

1.5   CD system
Hi-Fi system, pre-amplifier, amplifier and equalizer system, stereo amplifiers

2. **Television**   (12 hrs)

2.1   Monochrome TV Communication:

-   Elements of TV communication system.
-   Scanning- its need for picture transmission.
-   Need for synchronizing and blanking pulses.
-   Progressive scanning- Gross structure filters, interlaced scanning, resolution and band width requirement, tonal gradation.
-   Composite Video signal (CVS) at the end of even and odd fields. equalizing pulses and their need
-   Monochrome picture tube – construction and working, comparison of magnetic and electric deflection of beam

- Construction and working of camera tube: vidicon and plumbicon, Block diagram of TV camera and the transmitter chain.

- Block diagram of a TV receiver: function of each block and waveform at the input and output of each block.

- Frequency range of various VHF bands and channels used in India. Major specification of the CCIR.

2.2   Concept of positive and negative modulation VSB Transmission Turner
-    Typical circuits of scanning and EHT stages of TV receiver, keyed AGC, function and location of brightness contrast V-hold, H-hold of centering control.
-    Identification of faulty stage by analyzing the symptoms and basic idea of a few important faults and there remedies

2.3   Colour Schemes

-    Introduction to PAL, NTSC, SECAM systems, advertisement and disadvantages block diagram of video camera and its explanation
-    Construction and working principles of trinitran and PIL types of colour picture tubes.
-    Concept of convergence, purity of beam shifting
-    Block diagram of PAL TV receiver, explanation and working

3.   **Colour TV**   (12 hrs)

-    Primary colours, tristimulus values, trichromatic coefficients, concepts of additive and subtracting mixing of colours, concepts of luminance, Hue and Saturation, Representation of a colour in colour triangle, non spectral colour, visibility curve

-    Compatibility of colour TV system with monochrome system. Block diagram of colour TV camera, Basic colour TV system-NTSC, SECAM, and PAL their advantages and disadvantages.

-    Construction and working principles of trinitron and PIL types of colour picture tubes. Concept of convergence, purity, beam shifting

-    Need for luminance signal and band sharing by colour signals, sub-carriers frequency, colour difference signal and its need, synchronous quadratic modulation and representation of a colour by a vector, burst signal and its need, chrominance signal.

-    Block diagram of PAL TV receiver, explanation and working

4.   **Cable Television**   (03 hrs)

Block diagram and principles of working of cable TV and DTH, cable TV using internet

5.   **VCR, VCD and DVD**   (06 hrs)

Principle of video recording on magnetic tapes, block diagram of VCR, VHS tape transport mechanism.

6.   **Video Camera**

Study of VCD and DVD

DEC-501 CONSUMER ELECTRONICS LAB

LIST OF PRACTICALS

1.   To plot the frequency response of a microphone

2.   To plot the frequency response of a loud speaker

3.   Demonstration of a tape-transport mechanism

4.   Trouble shooting of tape-recorder system

5.   To observe the wave forms and voltage B/W and colour T.V receiver.

6.   Fault finding of colour T.V

7.   Trouble shooting of C.D. Player

8.   Demonstration of DVD Player.

9.   Demonstration and study to VCD especially its transport mechanism.

10.   Study of a TV cable network system through internet

RECOMMENDED BOOKS

1.   Colour Television-principles & practice R.R Gulati by Wiley Eastern Limited, New Delhi

2.   Complete Satellite & cable Television R.R Gulati New age International Publisher

3.   Colour Television Servicing by RC Vijay BPB Publication, New Delhi

4.   Colour Television & Video Technology by A.K. Maini CSB Publishers

5.   VCR-principles, maintenance & repair by S.P. Sharma, Tata Mc Graw Hill, New Delhi

6.   Colour TV by A.Dhake

7.   Service Manuals, BPB Publication, New Delhi

DEC-502   MAINTENANCE OF COMPUTER SYSTEM (MOCS)

L T P
3   -   -

RATIONALE

PCs have become a necessity in Industry, offices & becoming popular in homes too. This course gives organization structure and principles of working of various other components like visual display, keyboard drives & printers etc. Diploma holders will find employment in computer industry, Repair & maintenance field.

DETAILED CONTENTS

1. **CRT Display Device**   (06 hrs)

    Block Diagram, Principle of operation of Computer Monitor, Difference between
    TV & Computer Monitor. Video Display Adopters (Monocrome & Colour Graphic
    Adopter)

2. **Printers**   (06 hrs)

    Printing Mechanism, Construction and working principles and Dot Matrix Printer,
    Inkjet Printer, Laser Printer, Printer Controller, Concentric Interface, Signals from
    PC to Printer & Printer to PC.

3. **Keyboard & Mouse**   (06 hrs)

    Block Diagram of keyboard Controller, keyboard switches, keyboard faults,
    mouse, common faults with mouse. Introduction to scanner, digitizer.

4. **Buses & Ports**   (06 hrs)

    Different type of Buses PCI, ISA, SCSI & Ports COM 1, COM 2, LPTI, USB.

5. **Secondary Memory**   (08 hrs)

    Principle & Construction of Floppy Disk Drive & hard disk device (HDD). Floppy
    disk Controller & Hard disk controller. Pen Drives, common faults with hard disk
    drive & floppy disk drive.

6. **Mother Board**   (06 hrs)

    Introduction to different type of mother boards
    Single Board Based System, Block diagram of motherboard. Installation of
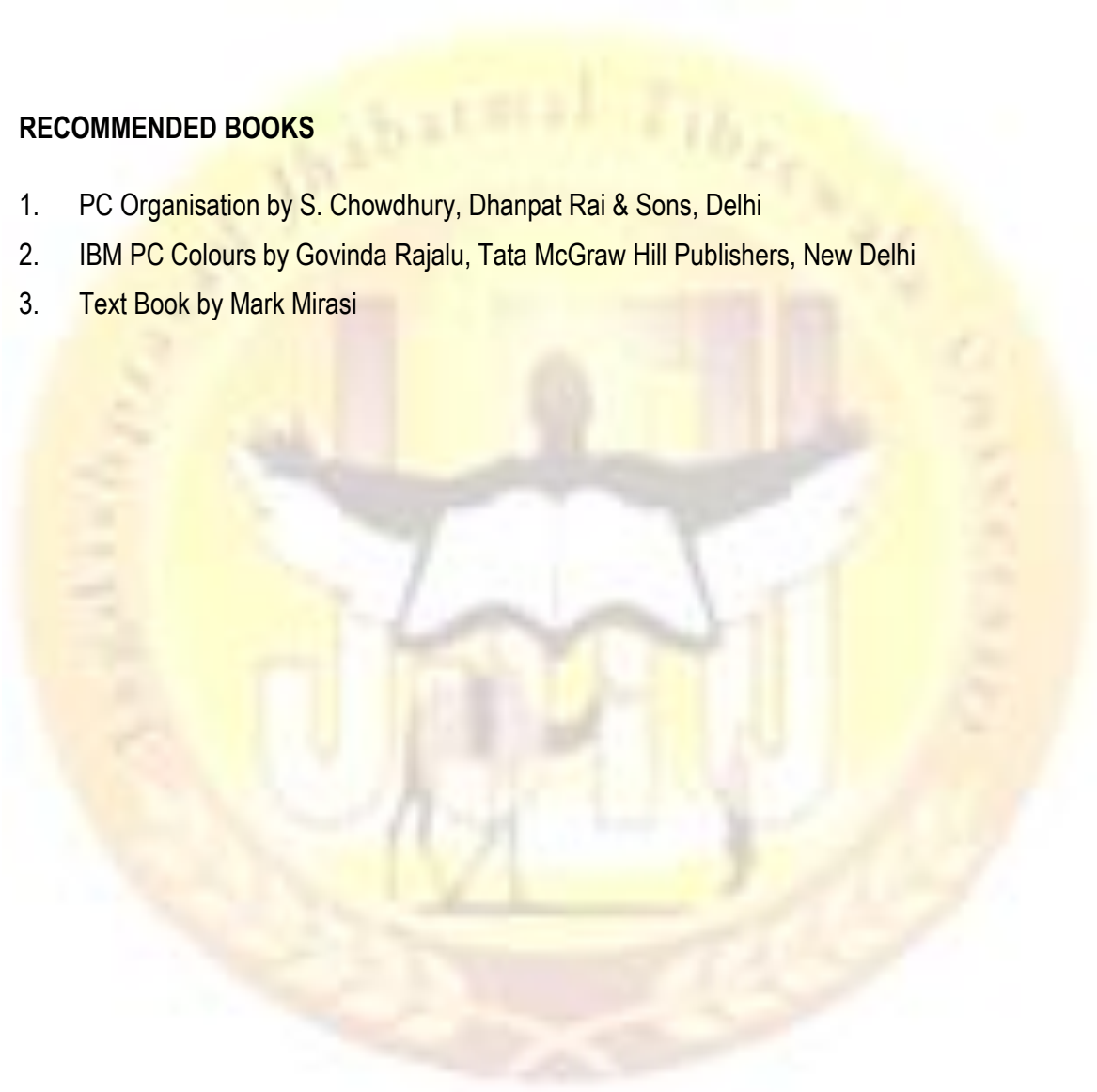   Computer System.

7. **Network Devices** (05 hrs)

Brief Introduction & working of following
HUBS, Routers, Bridges, Switches, LANS, WANS

RECOMMENDED BOOKS

1. PC Organisation by S. Chowdhury, Dhanpat Rai & Sons, Delhi
2. IBM PC Colours by Govinda Rajalu, Tata McGraw Hill Publishers, New Delhi
3. Text Book by Mark Mirasi

DEC-503 MICRO CONTROLLERS AND PLCs

L T P
4 – -

RATIONALE

In industry, many manufacturing processes demand a sequence of operation, which are to be performed repetitively. Early automation systems were mechanical in design, timing and sequencing being effected by gears and cams. Slowly these design concepts were replaced by electrical drives which were controlled by relays and now by programmable logic controllers (PLCs). A PLC is a solid state device, designed to operate in noisy industrial environments and can perform all logic functions. PLCs are widely used in all industries for efficient control operations

A diploma holder in industry is called upon to design , modify and troubleshoot such control circuits. Looking at the industrial applications of PLCs in the modern industry, this subject finds its usefulness in the present curriculum.

Micro-controllers have assumed a great significance in the electronic and consumer goods industry and are a very vital field..

DETAILED CONTENTS

1. **Microcontroller series (MCS) – 51 Overview**   (08 hrs)
   - Pin details
   - I/O Port structure
   - Memory Organization
   - Special Function Registers (SFRS)
   - External Memory

2. **Instruction Set; Addressing Modes, Instruction types**   (8 hrs)

   - Timer operation
   - Serial Port operation
   - Interrupts

3. **Assembly language programming**   (08 hrs)

   - Assembler directives
   - Assembler operation

4. **Design and Interface**   (08 hrs)

   Eamples like keypad interface, 7- segment interface etc

5. **Introduction to PLCs**   (06 hrs)

- Architectural details – Processor
- Memory structure, I/O Structure
- Programming terminal, Power Supply

6. **Working of PLC** (06 hrs)

Basic principle, response time, effects of response time, relay replacing, Basic instructions, PLC registers and program scan

7. **Instruction Set** (04 hrs)

Latching, counter, timers one shet, shift register, math, Boolean instructions

8. **Ladder diagram programming** (04 hrs)

9. **Applications of PLCs** in industry with case studies from electronics industry (04 hrs)

RECOMMENDED BOOKS

1. The 8051 Micro controller by I Scot Mackenzie, Prentice Hall International, London

2. The 8051 Micro Controllers Architecture, Programming and Applications by Ayala; Penram

International

3. Process Control Instrumentation Technology by Johnson, Curtis; EEE Edition, Prentice Hall of

India, New Delhi

4. Programmable Logic Controller by Job Dan Otter; P. H. International, Inc, USA

DEC-504   COMMUNICATION ENGINEERING -II

L T P
3 - 3

RATIONALE

This subject includes an exposure to microwaves engineering, radar systems, fibre optics and satellite communication. In microwaves industry, job opportunities are available in of assembly, production, installation, repair and maintenance of microwave transmitters and receivers. The knowledge of radar systems allows opportunities with civil and defence organizations dealing with aircraft and shipping. Fibre optics is the latest thrust area in communication with vast opportunities in the private sector.

DETAILED CONTENTS

1. **Introduction to Microwaves**   (03 hrs)

    Introduction to microwaves and its applications, Classification on the basis of its frequency bands (HF, VHF, UHF, L, S, C, X, KU, KA, mm, SUB, mm)

2. **Microwave Devices**   (09 hrs)

    Basic concepts of thermoinic emission and vacuum tubes, Effects of inter-electrode capacitance Lead Inductance and Transit time on the high frequency performance of conventional vacuum tubes, and steps to extend their high frequency operations.

    Construction, characteristics, operating principles and typical applications of the following devices (No mathematical treatment)

    -     Multi cavity klystron
    -     Reflex klystron
    -     Multi-cavity magnetron
    -     Traveling wave tube
    -     Gunn diode and
    -     Impatt diode

3. **Wave guides**   (04 hrs)

    Rectangular and circular wave guides and their applications. Mode of wave guide; Propagation constant of a rectangular wave guide, cut off wavelength, guide wavelength and their relationship with free space wavelength (no mathematical derivation). Impossibility of TEM mode in a wave guide. Field configuration of TE_{10}, TE_{20} and TM_{11} modes.

4. **Microwave Components**   (04 hrs)

Constructional features, characteristics and application of tees, bends, matched termination, twists, detector, mount, slotted section, directional coupler, fixed and variable attenuator, isolator, circulator and duplex, coaxial to wave guide adapter.

5. **Microwave antennas**   (03 hrs)

Structure characteristics and typical applications of Horn and Dish antennas

6. **Microwave Communication systems**   (03 hrs)

    a) Block diagram and working principles of microwave communication link.
    b) Troposcatter Communication: Troposphere and its properties, Tropospheric duct formation and propagation, troposcatter propagation.

7. **Radar Systems**   (06 hrs)

Introduction to radar, its various applications, radar range equation (no derivation) and its applications.

    a) Block diagram and operating principles of basic pulse radar. Concepts of ambiguous range, radar area of cross-section and its dependence on frequency.
    b) Block diagram and operating principles of CW (Doppler) and FMCW radars, and their applications.
    c) Block diagram and operating principles of MTI radar.
    d) Radar display- PPI

8. **Satellite Communications**   (06 hrs)

    (a) Basic idea of passive and active satellites. Meaning of the terms orbit , apogee, perigee
    b) Geostationary satellite and its need. Block diagram and explanation of a satellite communication link. Link losses etc.
    c) Transponders multiple access techniques, VSAT & its features

DEC-507   COMMUNICATION ENGINEERING –II LAB

LIST OF PRACTICALS

1.   To measure electronics and mechanical tuning range of a reflex klystron

2.   To measure VSWR of a given load.

3.   To measure the Klystron frequency by slotted section method

4.   To measure the directivity and coupling of a directional coupler.

5.   To plot radiation pattern of a horn antenna in horizontal and vertical planes.

6.   To verify the properties of magic tee.

7.   To carry out installation of a dish antenna.

NOTE:

Visit to the appropriate sites of microwave industries, radar installations and communication stations should be made to understand their working. A comprehensive report must be prepared by all the students on these visits, especially indicating the dates and locations of their visits.

RECOMMENDED BOOKS

1.   Microwave Devices and Components by Sylio, Prentice Hall of India, New Delhi

2.   Electronics Communication by Reddy and Coolen

3.   Electronics Communication System by KS Jamwal, Dhanpat Rai & Sons, Delhi

DEC-505 ADVANCED MICROPROCESSORS

L   T   P
3   -   3

RATIONALE

The complex systems require high through put that at times is not met with 8-bit microprocessor system. So, 16 bit up based system become suitable. They provide better facilities to personal computers and other automatic process control systems. Micro controller based system design provides facilities for economical & less complicated small process control system.

DETAILED CONTENTS

1. **The 8086 Microprocessor**   (08 hrs)

   - Internal Architecture of 8086.
   - Concept of memory segmentation & physical address generation.
   - Memory and date addressing mode
   - Minimum and Maximum mode of 8086.

2. **System Design using 8086**   (06 hrs)

   - Pins and Signals.
   - CLK circuitry
   - 8086 Address and Data bus Concept
   - Memory and I/o Interface block diagram
   - Math coprocessor 8087

3. **Programming of 8086**   (10 hrs)

   - Instruction Format
   - Data transfer, Arithmetic, Bit & Logical manipulation, String, Program transfer and processor control instructions.
   - Programming using manual assembly on exercises like

     (i)   Addition & Subtraction of two 16 bit numbers.

     (ii)   Multiplication's & Division of two numbers

     (iii)   Moving a block of data (intra and inter segment)

     (iv)   To arrange a block of data in ascending/descending order.

   - Use of assembler and assembler directives.

4.   **8086 Interrupt System**   (4 hrs)

Concept
-          Interrupt Vector table and Interrupt type code.
-          Types of interrupts and interrupt priority.
-          Predefined Interrupts (0 to 4).
-          User defined software/hardware interrupts.

5.   **Micro Controller**   (08 hrs)

Introduction of Micro Controllers.
-          Main features and architecture of 8051/8951
-          Application of Micro controllers such as washing machines, photocopier, cars etc

6.   **Application of Microprocessors-**   (08 hrs)

Use of microprocessor (with block diagram, main devices used and operation) for applications like-

(i)   A microprocessor based weighing scale

(ii)   Temperature measurement and control system

(iii)   Data Acquisition system.

(iv)   Speed control of DC motor.

7.   **Introduction to 32 bit Microprocessors**   (04 hrs)

Main features of 80386, 80486, Pentium microprocessor.

DEC-508 ADVANCED MICROPROCESSORS LAB

LIST OF PRACTICALS

1.   Familiarization of different keys of 8086-microprocessor kit and its memory map.

2.   Steps to enter, check /modify data or program and to execute a program on 8086 microprocessor kit.

3.   Writing and execution of ALP on 8086 for addition/subtraction of two 16 bit numbers (signed & unsigned).

4.   Writing and execution of ALP on 8086 kit for Multiplication/Division of two signed/unsigned numbers.

5.   Writing   and   execution   of   ALP   on   8086   kit   for   arranging   a   block   of   data   in

ascending/descending order.

6. Writing and execution of ALP on 8086 kit to generate nos of series like 1,1,2,3,5,8,13,21------.

7. Writing and execution of ALP for stepper motor control using stepper motor interfacing card.

8. Study and use of Logic controller Interface card.

9. Study and use of opto coupler interface card.

10. Exercise on micro controller kit 8051.

11. Use of 8086 emulator for hardware testing.

RECOMMENDED BOOKS

1. Microprocessor and Application by D.V. Hall.

2. 8051 Micro Controller.

3. Microprocessor 8086/88 by B.B. Brey

4. Microprocessors & Micro controllers by Dr. B.P. Singh

5. Microprocessor by Rajiv Sapra, Ishan Publications, Ambala

6. Microprocessor by Naresh Grover

7. Microprocessors and Microcomputers and their Applications by AK Mukhopadhyay

8. Microprocessors and Applications by Uffenback

9. Introduction to Microprocessor by Adithya Mathur, Tata McGraw Hill Publishing Co, New Delhi

10. Microprocessor Architecture, Programming and Applications with 8085 by RS Gaonkar, Wiley Eastern Ltd, New Delhi

11. Microprocessor and Applications by B Ram

12. Microprocessor by SK Goel

13. 8051 by Mcakenzie, Prentice Hall of India, New Delhi

DEC509MINOR PROJECTWORK

```
L  T  P
-  -  3
```

RATIONALE

The purpose of this subject is to give practice to the students in elementary design and fabrication of the PCB. The topics of assembly, soldering, testing, and documentation have been included to give overall picture of the process of manufacturing of electronic devices.

Minor project work aims at developing interest of the students about the, what is inside the electronics devices, what is happening and how it happens. The project may be small in size but should include only those components which he has studied in earlier classes, with a clear idea of signals processing. It would enable first hand experience of components, their purchase, assembly, testing and trouble shooting. It would boost up confidence of the students to repair and preparation of electronics gadgets. There should not be more than 2-3 students for each project. A report must be prepared with a hard and soft copy.

Some of the projects are listed below which is just a guideline for selecting the minor project. Students can also select any other project with the advice of his teacher.

1.   Regulated power supply
2.   Timers using 555 and other oscillators
3.   Touch plate switches – transistorized or 555 based
4.   Door bell/cordless bell
5.   Clapping switch and IR switch
6.   Blinkers
7.   Sirens and hooters
8.   Single hand AM or FM
9.   Electronic toy gun, walker, blinkers
10.   Electronic dice
11.   Cell charger, battery charger, mobile charger
12.   Fire/smoke/intruder alarm
13.   Liquid level controller
14.   Counters
15.   Combination locks
16.   Electronics musical instruments
17.   Telephone handset
18.   Audio amplifiers
19.   Tape recorders
20.   Automatic stabilizer/CVT
21.   Emergency light
22.   Design and manufacture of transformer
23.   Fan regulator

This practical training of 3-4 weeks duration will carry 100 marks. 50 marks will be given by industrial/field supervisors and 50 marks by the teacher supervising this training. The components and criteria of evaluation will include the following :

	Criteria	Weightage
a)	Punctuality and regularity	15%
b)	Initiative in learning new things	15%
c)	Relationship with people	15%
d)	Report writing and seminar	55%

ENTREPRENEURIAL AWARENESS CAMP

This is to be organized at a stretch for two to three days during second year. Lectures will be delivered on the following broad topics. There will be no examination for this subject

1. Who is an entrepreneur?

2. Need for entrepreneurship, entrepreneurial career and wage employment

3. Scenario of development of small scale industries in India

4. Entrepreneurial history in India, Indian values and entrepreneurship

5. Assistance from District Industries Centres, Commercial Banks. State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other financial and development corporations

6. Considerations for product selection

7. Opportunities for business, service and industrial ventures

8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)

9. Legal aspects of small business

10. Managerial aspects of small business

DEC-601   MEDICAL ELECTRONICS

L T P
4 - 0

RATIONALE

A large number of electronic equipment s are being used in hospitals for patient care and diagnosis or carry out advanced surgeries. This subject will enable the students to learn the basic principles of different instruments used in medical science.

DETAILED CONTENTS

1. **Anatomy and physiology**   (06 hrs)

   - Elementary ideas of cell structure
   - Heart and circulatory system.
   - Central nervous system
   - Muscle action
   - Respiratory system
   - Body temperature and reproduction system

2. **Overview of Medical Electronics Equipments,** classification, application and   (04 hrs)
   specifications of diagnostic, therapeutic and clinical laboratory equipment, method of operation of these instruments

3. **Electrodes**   (08 hrs)

   Bioelectric signals, Bio electrodes, Electrode, Electrode tissue interface, contact impedance, Types of Electrodes, Electrodes used for ECG , EEG

4. **Transducers**   (08 hrs)

   Typical signals from physiological parameters, pressure transducer, flow transducer, temperature transducer, pulse sensor, respiration sensor,

5. **Bio Medical Recorders**   (12 hrs)

   Block diagram description and application of following instruments

   - ECG Machine
   - EEG Machine
   - EMG Machine

6. **Patient Monitoring Systems**   (12 hrs)

- Heart rate measurement
- Pulse rate measurement
- Respiration rate measurement
- Blood pressure measurement
- Principle of defibrillator and pace mark
- Use of Microprocessor in patent monitoring.

7. **Safety Aspects of Medical Instruments**   (06 hrs)

- Gross current shock
- Micro current shock
- -Special design from safety consideration
- Safety standards.

RECOMMENDED BOOKS

1.   Handbook of biomedical Instrumentation by RS Khandpur

2.   Biomedical Instrumentation by Cromwell,

3.   Modern Electronics Equipment by RS Khandpur, TMMH, New Delhi

4.   Introduction to BioMedical Electronics by Edward J. Perkstein; Howard Bj, USA

DEC-602   INSTRUMENTATION

```
L   T   P
4   -   3
```

RATIONALE

This subject deals with the various instruments, their construction and working which control the various parameters and operations in any industry. Electrical supervisor employed in maintenance of electrical equipment, machinery is required to diagnose faults, rectify them and test the total system for good performance. Thus there is a need of introducing diploma holders to the basics of Instrumentation.

DETAILED CONTENTS

1. **Measurements**   (04 hrs)

   Importance of measurement, Basic measuring systems, advantages and limitations of each measuring systems, generalized measurement system, signal conditioning and display devices

2. **Transducers**   (08 hrs)

   Theory, construction and use of various transducers (resistance inductance, capacitance, electromagnetic, piezo electric type)

3. **Measurements of Displacement and Strain**   (08 hrs)

   Displacement Measuring Devices: wire wound potentiometer, LVDT, strain gauges, different strain gauges such as inductance type, resistive type, wire and foil etc. Gauge factor, gauge materials, and their selections, sources of errors and its compensations. Use of electrical strain gauges, strain gauge bridges and amplifiers.

4. **Force and Torque Measurement**   (10 hrs)

   Different types of force measuring devices and their principles, load measurements by using elastic Transducers and electrical strain gauges. Load cells, proving rings. Measurements of torque by brake, dynamometer, electrical strain gauges, speed measurements; different methods, devices.

5. **Pressure Measurement**   (08 hrs)

   Bourdon pressure gauges, electrical pressure pick ups and their principle, construction application and use of pressure cells.

6. **Flow Measurement**   (06 hrs)

Basic principles of magnetic and ultrasonic flow meters

7. **Measurement of Temperature** (08 hrs)

Bimetallic thermometer, pressure thermometers, thermoelectric thermometers, resistance thermometer, thermocouple, thermisters and pyrometer, errors in temperature measurements in rapidly moving fluids. Temperature recorders

8. **Measurement** of other non electrical quantities such as humidity, pH,level, (06 hrs)

9. **Elements** of telemetry and data acquisition system

INSTRUCTIONAL STRATEGY

The teacher should explain the scope of various measuring devices and their practical application in the field. The transducers and measuring devices must be shown to the students and they should be trained in the selection, operation, maintenance and calibrations. Frequent visits to nearby process industries will be of immense help to the students

DEC-606   INSTRUMENTATION LAB

LIST OF PRACTICALS

1. Measurement and plot of characteristics of optical devices like photodiodes, photocells

2. Characteristics of light operated switch using photo transistor and LDR

1. Measurement of strain using strain gauge

2. Measurement of pressure using pressure using pressure cell

3. Measurement of sound level using sound level meter

4. Measurement of temperature using themistor and thermocopies

5. Measurement of load using load cell

6. Measurement of humidity using humidity meter

7. Measurement of linear and angular displacement

8. Measurement of flow rate using flow sensors

9. Measurement of angular distance using linear variable capacitor

RECOMMENDED BOOKS

1.   Electronic Measurement and Instrumentation by Dr Rajendra Prasad

2.   Electrical and Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai and Co., New Delhi

3.   Electronic Instrumentation and Measurement Techniques by WD Cooper, AD Helfrick Prentice Hall of India Pvt. Ltd. New Delhi

4.   Electronics Tests and Measurement Techniques by Rajiv Sapra

DEC-603 DIGITAL AND DATA COMMUNICATION

L T P
5 – 3

RATIONALE

This course deals with the advanced digital and data communication techniques. It involves the use of modems in synchronous and asynchronous data transmission. It encompasses the modern communication network and integrated services like ISDN and radio paging along with cellular mobile telephones, FAX, electronic exchanges etc. The students should understand the advantages and limitations of various analog and digital modulation systems on a comparative scale and relate to them while studying practical communication systems.

DETAILED CONTENTS

1. **Introduction**   (04 hrs)

    Basic block diagram of digital and data communication systems, Their comparison with analog communication system. Synchronous and Asynchronous communication system.

2. **Digital Communication**   (12 hrs)

    Basic scheme of PCM system, quantization, quantization error companding, block diagram of TDM-PCM communication system and function of each block Advantages of PCM system, concept of differential PCM (DPCM) system

3. **Data Communication Hardware**   (12 hrs)

    UART, USART, their need in communication. Need and function of modems. Mode of modems operation (low speed, medium speed and high speed modems).   Modem interconnection, Modem data transmission speed. Modem modulation methods, Modem interfacing (RS 232 interface other interfaces)

4. **Network and Control Considerations**   (16 hrs)

    Protocols and their functions
    Data communication network organisation. Basic idea of various modes of digital switching Circuit switching, message switching, packet switching.
    a) Basic concept of integrated services.
    b) Digital Network (ISDN) its need in modern communication, brief idea of ISDN interfaces
    c) Basic idea of local area Network (LAN), and its various topologies, LAN interconnection, Eathernet
    d) Introduction to EPABX

5. **Mobile Communication** (10 hrs)

Operation of Cellular mobile telephone system. cells and frequency reuse, cell spitting, cell sectoring, interference, handover, concept of first generation analog, second generation TDMA (GSM) and CDMA cellular system. Introduction to personal communication system (PCs). Introduction to WLL, Introduction to G_1, G2, G_3 mobile communication

6. **Facsimile (FAX)** (06 hrs)

Basic idea of FAX system and its applications; Principle of operation and block diagram of modern FAX system. Important features of modern FAX machines.

DEC-607 DIGITAL AND DATA COMMUNICATION LAB

LIST OF PRACTICALS

1. Observe wave forms at pulse code modulation and demodulation

2. To study the construction and working of a telephone handset.

3. To study the construction and working of a FAX machine.

4. To study the features and working of an EPABX.

5. To study the working & features of a cellular mobile system and pagers.

6. To study the working of a LAN system.

NOTE
Visits to the sites of all types of telephone exchanges including mobile and rural exchanges be made with a view to understand their working. A comprehensive report must be prepared by all the students on these visits, especially indicating the dates and locations of their visits.

RECOMMENDED BOOKS

1. Mobile and Wireless Communication by W.Stalling, Pearson Publishers

2. Electronics Communication System by KS Jamwal, Dhanpat Rai & Co., New Delhi

3. Computer Network by Tenenbaun Andrews, Prentice Hall of India, New Delhi

4. Data Communication and Networking by Foronzan TMH, New Delhi

DEC-604   POWER ELECTRONICS LAB

L T P
4 - 2

RATIONALE

Diploma holders in Electronics and Instrumentation and Control   are required to handle a wide variety of power electronic equipment used in process control Industry. This subject will provide the student basic understanding of the principles of their working. The practical training will further re-inforce the knowledge and skill of the students.

DETAILED CONTENTS

1.   **Introduction to thyristors and other power electronics devices**   (12 hrs)

      a)   Construction, Working principles of SCR, two transistor analogy of SCR, VI characteristics of SCR.

      b)   SCR specifications & ratings.

      c)   Different methods of SCR triggering.

      d)   Different commutation circuit for SCR.

      e)   Series & parallel operation of SCR.

      f)   Construction & working principle of DIAC, TRIAC & their V-I characteristics.

      g)   Construction, working principle of UJT, VI characteristics of UJT. UJT as rrelaxation oscillator.

      h)   Brief introduction to Gate Turn off thyristor (GTO), Programmable uni-function transistor (PUT), MOSFET, IGBT.

      i)   Basic idea about the selection of Heat sink for thyristors.

      j)   Application such as light intensity control, speed control of universal motors, fan regulator, battery charger.

2.   **Controlled Rectifiers**   (06 hrs)

      a)   Single phase half wave controlled rectifier with load (R, R-L)
      b)   Single phase half controlled full wave rectifier (R, R-L)
      c)   Fully controlled full wave bridge rectifier.
      d)   Single phase full wave centre tap rectifier.

3. **Inverters, Choppers, Dual Converters and Cyclo converters.** (12 hrs)

  i) Principle of operation of basic inverter circuits, concepts of duty cycle, series & parallel. Inverters & their application.

  ii) Choppers: Introduction, types of choppers (Class A, Class B, Class C and Class D). Step up and step down choppers.

  iii) Dual Converters & cyclo converters: Introduction, types & basic working principle of dual converters & cyclo converters & their application.

4. **Tyristorised Control of Electric drives** (08 hrs)

  a) DC drive control
  i) Half wave drives.
  ii) Full wave drives
  iii) Chopper drives (Speed control of DC motor using choppers)

  b) AC drive control
  i) Phase control (Speed control of induction motor using variable frequency)

  ii) Constant V/F operation
  iii) Cycloconverter/Inverter drives.
  iv) Slip power control of AC drives.

5. **Uninterrupted Power supplies** (04 hrs)

  i) UPS, on-line, off line & its specifications
  ii) Concept of high voltage DC transmission

DEC-608 POWER ELECTRONICS LAB

LIST OF PRACTICALS

1. To plot VI characteristic of an SCR.

2. To plot VI characteristics of TRIAC.

3. To plot VI characteristics of UJT.

4. To plot VI characteristics of DIAC.

5. Study of UJT relaxation oscillator. And observe I/P and O/P wave forms

6. Observation of wave shape of voltage at relevant point of single-phase half wave controlled rectifier and effect of change of firing angle.

7. Observation of wave shapes of voltage at relevant point of single phase full wave controlled rectifier and effect of change of firing angle.

8. Observation of wave shapes and measurement of voltage at relevant points in TRIAC based AC phase control circuit for .

9. Varying lamp intensity of AC fan speed control.

10. Installation of UPS system and routine maintenance of batteries.

11. Speed control of motor using SCRs

RECOMMENDED BOOKS

1. Power Electronics by P.C. Sen Tata Mc Graw Hill. New Delhi

2. Power Electronics by P.S. Bhimbhrah, Khanna Publishers, New Delhi

3. Power Electronics by M.S. Berde, Khanna Publishers, New Delhi.

4. Power Electronics by MH Rashid

5. Industrial Electronics and Control by SK Bhattacharya and S. Chatterji, New Age Publications. New Delhi

6. Power Electronics by S Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi

7. Power Electronics by Sugandhi and Sugandhi

8. Power Electronics – Principles and Applications by J Michael Jacob, Vikas Publishing House, New Delhi

DEC-605   ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

L   T   P
3   -   -

RATIONALE

Entrepreneurship Development and Management is one of the core competencies of technical human resource. Creating awareness regarding entrepreneurial traits, entrepreneurial support system, opportunity identification, project report preparation and understanding of legal and managerial aspects can be helpful in motivating technical/ vocational stream students to start their own small scale business/enterprise. Based on the broad competencies listed above, following detailed contents are arrived to develop the stated competencies.

DETAILED CONTENTS

(1)   Entrepreneurship   (4 hrs)

        1.1   Concept/Meaning
        1.2   Need
        1.3   Competencies/qualities of an entrepreneur

(2)   Entrepreneurial Support System   (6 hrs)

        2.1   District Industry Centres (DICs)
        2.2   Commercial Banks
        2.3   State Financial Corporations
        2.4   Small Industries Service Institutes (SISIs), Small Industries Development Bank of India (SIDBI), National Bank for Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State level

(3)   Market Survey and Opportunity Identification (Business Planning)   (6 hrs)

        3.1   How to start a small scale industry

        3.2   Procedures for registration of small scale industry

        3.3   List of items reserved for exclusive manufacture in small scale industry

        3.4   Assessment of demand and supply in potential areas of growth

        3.5   Understanding business opportunity

        3.6   Considerations in product selection

        3.7   Data collection for setting up small ventures

(4)   Project Report Preparation   (6 hrs)

4.1	Preliminary Project Report
4.2	Techno-Economic feasibility report
4.3	Project Viability

(5) Managerial Aspects of Small Business (8 hrs)

5.1	Principles of Management (Definition, functions of management viz planning, organisation, coordination and control
5.2	Operational Aspects of Production
5.3	Inventory Management
5.4	Basic principles of financial management
5.5	Marketing Techniques
5.6	Personnel Management
5.7	Importance of Communication in business

(6) Legal Aspects of Small Business (6 hrs)

6.1	Elementary knowledge of Income Tax, Sales Tax, Patent Rules, Excise Rules
6.2	Factory Act and Payment of Wages Act

(7) Environmental considerations (6 hrs)

7.1	Concept of ecology and environment
7.2	Factors contributing to Air, Water, Noise pollution
7.3	Air, water and noise pollution standards and control
7.4	Personal Protection Equipment (PPEs) for safety at work places

(8) Miscellaneous (6 hrs)

8.1	Human relations and performance in organization
8.2	Industrial Relations and Disputes
8.3	Relations with subordinates, peers and superiors
8.4	Motivation – Incentives, Rewards, Job Satisfaction
8.5	Leadership
8.6	Labour Welfare
8.7	Workers participation in management

(9) Motivation (4 hrs)

9.1	Factors determining motivation
9.2	Characteristics of motivation
9.3	Methods of improving motivation
9.4	Incentives – pay, promotion, rewards

(10) Leadership (2 hrs)

10.1	Need for leadership
10.2	Functions of a leader

    10.3   Factors to be considered for accomplishing effective leadership

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)

2. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi

3. Environmental Engineering and Management by Suresh K Dhamija, SK Kataria and Sons, New Delhi

4. Environmental and Pollution Awareness by Sharma BR, Satya Prakashan , New Delhi

5. Thakur Kailash, Environmental Protection Law and policy in India: Deep and Deep Publications, New Delhi

6. Handbook of Small Scale Industry by PM Bhandari

7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi

8. Total Quality Management by Dr DD Sharma, Sultan Chand and Sons, New Delhi.

9. Principles of Management by Philip Kotler TEE Publication

DEC-609   MAJOR PROJECT WORK

L T P
- - 10

RATIONALE

Major Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place students for project oriented practical training in actual work situation for the stipulated period with a view to:

i)   Develop understanding regarding the size and scale of operations and nature of field-work in which students are going to play their role after completing the courses of study.
ii)   Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
iii)   Develop first hand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.
Iv)   Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.

The individual students have different aptitudes and strengths.   Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (say at the end of second year). Students should be allotted a problem of interest to him/her as a major project work.   It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

This practical training cum project work **should not be considered** as merely conventional industrial training in which students are sent at work places with either minimal or no supervision. This experience is required to be planned in advance and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience to students. It is necessary that each organization is visited well in advance and activities to be performed by students are well defined. The chosen activities should be such that it matches with the curricular interest to students and of professional value to industrial/ field organizations. Each teacher is expected to supervise and guide 5-6 students.

Some of the project activities are given below:

-      Projects related to designing small electronic equipment / instruments.

-      Projects related to increasing productivity in electronic manufacturing areas.

-      Projects related to quality assurance.

- Projects connected with repair and maintenance of plant and equipment.

- Projects related to design of PCBs.

- Projects related to suggesting substitutes of electronics components being used.

- Projects related to design of small oscillators and amplifier circuits.

- Projects related to design, fabrication, testing and application of simple digital circuits and components.

- Projects related to microprocessor based circuits/ instruments.

Some of the projects based on above areas are listed below for the benefit of students:

1. Microprocessor based rolling display/bell and calendar

2. Microprocessor based stepper motor control.

3. Speed control of DC Machines by Microprocessors.

4. Temperature monitoring using microprocessor based systems.

5. Microprocessor based liquid level indicator and control/solar tracking system

6. Fabrication and assembling of digital clock.

7. Design and fabrication of timing circuits using 555 and counters.

8. Design and fabrication of amplifiers and oscillators circuits.

9. Fabrication of demonstration type Radio receiver

10. Fabrication of PCB circuits using ORCAD/ Fagu Software.

11. Fabrication of ON line/OFF line UPS of different ratings and inverters

12. Design, fabrication and testing of different types of experimental boards as per the curriculum of Electronics and Communication Engineering.

13. Repair of X-Ray Machines, ECG, EEG, EMG, Calorimeter and Centrifuge etc.

14. Repair and fault location of telephone exchanges and intercom system.

15. Repair of oscilloscope, function generator, Power supply

16. Design and developing web sites of organizations

17. Installation of computer network (LANS).

18. Microprocessor based solar tracking system

19. Car or home security system

20. Bank token display

21. Printer sharing unit

22.   Caller Identification unit for phone

23.   LCR-Q meter and frequency meter

24.   µP-Based A/D converter

25.   µP-Based D/A converter

26.   Simulation of halfwave and full wave rectifiers using ORCAD

27.   Simulation of following circuits:

Integrator, differenciator, adder, substractor, V-I converter comparator etc. using OP-AMPs.

28.   Simulation of class A, Class B, Class AB and Class C amplifiers

29.   Simulation of different wave forms like sine, square, triangular waves etc.

NOTE:

The list is only the guideline for selecting a project, however a student is at liberty to select any other related project of his choice independently under guidance of his teacher

A suggestive criteria for assessing student performance by the external (person from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance Criteria	Max.** Marks	Rating Scale				
			Exce-llent	Very Good	Good	Fair	Poor
1.	Selection of project assignment	10	10	8	6	4	2
2.	Planning and execution of considerations	10	10	8	6	4	2
3.	Quality of performance	20	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20	20	16	12	8	4
5.	Sense of responsibility	10	10	8	6	4	2
6.	Self expression/ communication skills	5	5	4	3	2	1
7.	Interpersonal skills/human relations	5	5	4	3	2	1
8.	Report writing skills	10	10	8	6	4	2
9	Viva voce	10	10	8	6	4	2
	Total marks	**100**	**100**	**80**	**60**	**40**	**20**

The overall grading of the practical training shall be made as per following table.

In order to qualify for the diploma, students must get "Overall Good grade" failing which the students may be given one more chance to improve and re-evaluated before being disqualified and

declared "not eligible to receive diploma ". It is also important to note that the students must get more than six "goods" or above "good" grade in different performance criteria items in order to get "Overall Good" grade.

	Range of maximum marks	Overall grade
i)	More than 80	Excellent
ii)	79 <> 65	Very good
iii)	64 <> 50	Good
iv)	49 <> 40	Fair
v)	Less than 40	Poor

Important Notes

1.   This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.

2.   The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.

3.   The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.

4.   It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve another criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.