3.1 BASIC ELECTRONICS

L	P
4	2

RATIONALE

This subject gives the knowledge of fundamental concepts and principles of basic electronics and aims at providing the students with basic understanding of various types of materials such as conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers, significance and use of filters in rectifiers, basic structure and working principle of tunnel diodes, LEDs, varactor diodes, LCD; working of transistors in various configurations; fundamental knowledge of FETs and MOSFETs etc. and their applications. The teacher should give emphasis on understanding of concepts by explaining the various terms used in the subject. Practical exercises have been included in order to reinforce various concepts. Industrial/field exposure must be given by organizing industrial visit.

DETAILED CONTENTS

1. Semi conductor physics: (12 hrs)

   1.1 Review of basic atomic structure and energy levels, concept of insulators, conductors and semi conductors, atomic structure of Germanium (Ge) and Silicon (Si), covalent bonds
   1.2 Concept of intrinsic and extrinsic semi conductor, process of doping.
   1.3 Energy level diagram of conductors, insulators and semi conductors; minority and majority charge carriers.
   1.4 P and N type semiconductors and their conductivity, effect of temperature on conductivity of intrinsic semi conductors.

2. Semi conductor diode: (12 hrs)

   2.1 PN junction diode, mechanism of current flow in PN junction, forward and reverse biased PN junction, potential barrier, drift and diffusion currents, depletion layer, concept of junction capacitance in forward and reverse biased condition.
   2.2 V-I characteristics, static and dynamic resistance and their value calculation from the characteristics.
   2.3 Application of diode as half-wave, full wave and bridge rectifiers. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC and RC filters.
   2.4 Types of diodes, characteristics and applications of Zener diodes. Zener and avalanche breakdown.

3. Introduction to bipolar-transistors (12 hrs)

3.1 Concept of a bipolar transistor, its structure, PNP and NPN transistors, their symbols and mechanism of current flow; current relations in a transistor; concept of leakage current;

3.2 CB, CE, CC configurations of a transistor; Input and output characteristics in CB and CE configurations; input and output dynamic resistance in CB and CE configurations; current amplification factors. Comparison of CB, CE and CC configurations;

3.3 Transistor as an amplifier in CE Configuration; concept of dc load line and calculation of current gain and voltage gain using dc load line.

4. Transistor biasing circuits: (06 hrs)

Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits.

5. Single stage transistor amplifier: (10 hrs)

Single stage transistor amplifier circuit, ac load line and its use in calculation of current and voltage gain of a single stage amplifier circuit. Explanation of phase reversal of output voltage with respect to input voltage. H-parameters and their significance.

6. Field effect Transistors(FETs) (12 hrs)

Construction, operation and characteristics of FETs and their applications.

6.1 Construction, operation and characteristics of a MOSFET in depletion and enhancement modes and its applications.

6.2 FET amplifier circuit and its working principle (excluding analysis).

6.3 C MOS - advantages and applications

6.4 Comparison of JFET, MOSFET and BJT.

LIST OF PRACTICALS

1. Familiarization with operation and use of the following instruments.

Multi-meter, CRO, Signal generator, LCR meter, Regulated Power Supply by way of taking readings of relevant quantities with their help.

2. Plotting of V-I characteristics of a PN junction diode

3. Plotting of V-I characteristics of a Zener diode

4. Measurement of the voltage gain, input and output impedance in a single state CE amplifier circuit.

5. Fabrication of:

a. Half-wave rectifier circuit using one diode

b. Full-wave rectifier circuit using two diodes

c. Bridge-rectifier circuit using four diodes

6. Observation of the wave shapes for the following rectifier circuit

a) Half-wave rectifier
b) Full-wave rectifier
c) Bridge-rectifier

7. Plotting of the wave shape of full wave rectifier with

a. Shunt capacitor filter
b. Series inductor filter
c. RC filter

8. Measurement of the Q-point and observation of variation of Q-point by:

.

a. By increasing the base resistance in fixed bias circuit.
b. By changing out of bias resistance in potential divider circuit.

9. Plotting of input and output characteristics and calculation of parameters of transistors in CE configuration.

10. Plotting of input and output characteristics and calculation of parameters of transistors in CB configuration.

11. Measurement of voltage gain, input and output impedance in a single state CE amplifier circuit.

12. Plotting of V-I characteristics of a FET based amplifier.

INSTRUCTIONAL STRATEGY

The aim of this subject is to provide the knowledge of the fundamental concepts related to basic electronics. The teacher should give more emphasis on understanding of concepts and the measuring of various terms used in the subject. The students be made familiar with diodes, transistors, resistors, capacitors, inductors etc. and various measuring instruments such as Multi-meter, CRO, Signal generator, LCR meter, Regulated Power Supply etc. Practical exercises should be included to reinforce the various concepts. Practical applications of semiconductor diodes, transistors, field effect transistors etc must be elucidated to the students.

RECOMMENDED BOOKS

1. Basic Electronics and Linear Circuit by NN Bhargava, Kulshreshta and SC Gupta, Tata McGraw Hill Education Pvt Ltd., New Delhi.
2. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi
3. Electrical and Electronics Engineering by SK Bhattacharya, Pearson Education, New Delhi
4. Principles of Electronics by SK Bhattacharya and Renu Vig, SK Kataria and Sons, Delhi
5. Electronics Devices and Circuits by Millman and Halkias; McGraw Hill.
6. Principles of Electronics by Albert Paul Malvino; Tata McGraw Hill Education Pvt Ltd., New Delhi.
7. Basic Electronics – Problems and Solutions by Albert Malvino and David J. Bates; Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi.
8. Basic Electronics by J.S. Katre, Sandeep Bajaj, Tech. Max. Publications, Pune.
9. Analog Electronics by DR Arora, Ishan Publications, Ambala City.
10. Electronic Principles by SK Sahdev, Dhanpat Rai & Co., New Delhi
11. Analog Electronics by JC Karhara, King India Publication, New Delhi
12. Electrical and Electronics Engineering by SK Bhattacharya, Pearson Education, New Delhi
13. Electrical Devices and Circuits by Rama Reddy, Narosa Pulishing House Pvt. Ltd., New Delhi
14. Electronic Devices and Circuits by Dharma Raj Cheruku and Battula Tirumala Krishna: Pearson Education (Singapore) Pvt Ltd., Indian Branch, 482 F.I.E Patparganj, Delhi- 92
15. Basic Electronics by JB Gupta, SK Kataria and Sons, New Delhi
16. Grob's Basic Electronics- A text Lab Manual (Special Indian Edition) by Schultz, Tata McGraw Hill Education Pvt Ltd, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Semi Conductor Physics	12	20
2	Semi Conductor Diode	12	20

3	Introduction To Bipolar-Transistors	12	20
4	Transistor Biasing Circuits	6	5
5	Single Stage Transistor Amplifier	10	15
6	Field Effect Transistors	12	20
	Total	**64**	**100**

3.2 PRINCIPLES OF INSTRUMENTATION

L	T	P
3	-	2

RATIONALE

This syllabus has been designed to impart the knowledge of basic principles involved in instrumentation systems. The student will learn the various characteristics of instruments, means of transduction and displaying variables besides instrument selection criteria. The concepts will help the students in forming a solid foundation for higher learning.

DETAILED CONTENTS

1. Basics of Instrumentation Systems (08 hrs)

   - Scope and necessity of instruments
   - Measurement, its significance and types
   - Building blocks of instrumentation systems
   - Various testing signals
   - Important process variables and their units

2. Performance Characteristics of Instruments (16 hrs)

   - Static characteristics of instruments-accuracy, precision, linearity, resolution, sensitivity, hysteresis, drift, dead time, loading effects.
   - Dynamic inputs and dynamic characteristics-time constant, response time, natural frequency, damping coefficient.
   - Reliability, serviceability, cost effectiveness, and availability
   - Static and dynamic response (step response)
   - Order of Instruments
   - Environmental Effects
   - Calibration tools

3. Display and recording devices (18 hrs)

   - Operating mechanism in indicating and recording devices
   - Various indicating, integrating and recording methods and their combination

- Merits and demerits of circular chart and strip chart recorder
- Basics of printing devices
- Scanning, data logging and field buses
- Bar graph LCD, Seven segment display, X-Y recorder, scanners
- Design experiments for display system

4. Errors (06 hrs)

- Calibration of instruments
- Sources of errors
- Classification of errors
- Grounding/earthing
- Precautions

LIST OF PRACTICALS

1. To find the constant of 1st order instrument
2. To find the constant of 2nd order instrument
3. To find the response of 1st order instrument with step, sinusoidal and ramp input
4. To find the response of 2nd order instrument with step, sinusoidal and ramp input
5. To assemble seven segment display using LEDs
6. To make fourteen segments display using LCD and verify it
7. To make the DOT Matrix display and its verification
8. Make any word using LCD and LED
9. To study circular and strip chart recorder

INSTRUCTIONAL STRATEGY

This being a first branch specific subject, the teacher should lay emphasis on giving an overview of the field of instrumentation and control. In addition, for exposure the students should be taken to various process industries or where control system and electronic instrumentation is being used. The teacher shall demonstrate the instruments and their functioning.

LIST OF RECOMMENDED BOOKS

1. Mechanical and Industrial Measurement by RK Jain, Khanna Publishers,New Delhi

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

3. Elements of Electronic Instrumentation and measurement by Carr, Pearson Education , Sector 62, Noida
4. Electronic Instrumentation and measurement by Kishore, Pearson Education , Sector 62, Noida
5. Electrical and Electronic Measurement and Instrumentation by JB Gupta; S.K Kataria and Sons Publishers, New Delhi
6. Measurement Systems by EO Doeblin.
7. Industrial Instrumentation by Donald P Eickrman

8. Advanced Instrumentation and Control by MF Kureshi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Marks Allocation
1.	Basics of Instrumentation Systems	8	15
2.	Performance Characteristics of Instruments	16	35
3.	Display and Recording Devices	18	40
4.	Errors	6	10
Total		**48**	**100**

3.3 ELECTRICAL AND ELECTRONICS ENGINEERING MATERIALS AND COMPONENTS

L	T	P
5	-	-

RATIONALE

A diploma holder in Electrical Engineering will be involved in maintenance, repair and production of electrical equipment and systems. In addition, he may be required to procure, inspect and test electrical and electronic engineering materials. Knowledge of various types of materials will be needed in order to execute the above-mentioned functions. He may also have to decide for an alternative when a particular material is either not readily available in the market or its cost becomes prohibitive.

DETAILED CONTENTS

1. **Materials** **(40 hrs)**

1.1 Classification of materials (04 hrs)

Conducting, semi-conducting and insulating materials through a brief reference to their atomic structure and energy bands.

1.2 Conducting Materials (14 hrs)

- Resistors and factors affecting resistivity such as temperature, alloying and mechanical stressing. Classification of conducting materials as low resistivity and high resistivity materials.
- Applications of Copper, Aluminium , Steel, low resistivity copper alloys such as brass, bronze, copper graphite etc in the field of electrical engineering.
- Superconductivity and piezoelectric ceramic materials

1.3 Insulating Materials (08 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 (06 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.

1.5. Special Materials (04 hrs)

Thermocouple, bimetals, lead soldering and fuse material, mention their applications

1.6. Introduction of various engineering materials necessary for fabrication of electrical machines such as motors, generators, transformers etc (04 hrs)

2. Components (40 hrs)

2.1 Capacitors (14 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) (4 hrs)

2.3 Transformer, inductors and RF coils: (5 hrs)

Methods of manufacture, testing, Need of shielding, application and trouble shooting

2.4 Surface Mounted Devices (SMDs): (5 hrs)

Constructional detail and specifications.

2.5 Connectors, Relays, switches and cables: (4 hrs)

Different types of connectors, relays, switches and cables, their symbols, construction and characteristics.

2.6 Semi Conductors and Integrated Circuits (ICs) - Characteristics and testing (08 hrs)

- Basic characteristics of semiconductor materials, testing of diodes, transistors, FETs and SCRs.
- Various processes in IC manufacturing. Hybrid IC technology.

INSTRUCTIONAL STRATEGY

The teacher should bring different materials, electronic components and devices in the class while taking lectures and explain and make students familiar with them. Also he may give emphasis on practical applications of these devices and components in the field. In addition, the students should be given exercises on identification of materials used in various electronic gadgets etc .and be encouraged to do practical work independently and confidently.

RECOMMENDED BOOKS

1. Electrical and Electronic Engineering Materials by SK Bhattacharya, Khanna Publishers, New Delhi
2. Electronic Components and Materials by Grover and Jamwal, Dhanpat Rai and Co., New Delhi
3. Electrical Engineering Materials by Sahdev, Unique International Publications
4. Electronic Components and Materials by SM Dhir, Tata Mc Graw Hill, New Delhi
5. Electrical Engineering Materials by PL Kapoor, Khanna Publishers, New Delhi
6. Electrical and Electronics Engineering Materials BR Sharma and Others, Satya Parkashan, New Delhi
7. Electrical and Electronics Engineering Materials DR Arora, Ishan Publications, Ambala City
8. Electrical Engineering Materials by Rakesh Dogra, SK Kataria and Sons, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
Materials			
11	Classification of Materials	4	5
1.2	Conducting Materials	14	15
1.3	Insulating Materials	8	10
1.4	Magnetic Materials	6	10
1.5	Special Materials	4	5
1.6	Introduction to various Engineering Materials	4	5
Components			
2.1	Capacitors	14	20
2.2	Resistors	4	5
2.3	Transformers, Inductors	5	5

2.4	SMDs	5	5
2.5	Connectors, Relays	4	5
2.6	Semiconductors & ICs	8	10
	Total	**80**	**100**

3.4 DIGITAL ELECTRONICS

L T P
4 - 3

RATIONALE

This syllabus has been designed to make the students know about the fundamental principles of digital electronics and gain familiarity with the available IC chips. This subject aims to give a background in the broad field of digital systems design and microprocessors.

DETAILED CONTENTS

1. Introduction (02 hrs)

   a) Distinction between analog and digital signal.
   b) Applications and advantages of digital signals.

2. Number System (04 hrs)

   a) Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa.
   b) Binary addition, subtraction, multiplication and division including binary points. 1's and 2's complement method of addition/subtraction, sign magnitude method of representation, floating point representation

3. Codes and Parity (04 hrs)

   a) Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code.

   b) Concept of parity, single and double parity and error detection

   c) Alpha numeric codes: ASCII and EBCDIC.

4. Logic Gates and Families (07 hrs)

   a) Concept of negative and positive logic

   b) Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates.

   (c) Logic family classification:

   - Definition of SSI, MSI, LSI, VLSI
   - TTL and C MOS families and their sub classification

- Characteristics of TTL and C MOS digital gates. Delay, speed, noise margin, logic levels, power dissipation, fan-in, power supply requirement and comparison between TTL and C MOS families

5. Logic Simplification (06 hrs)

a) Postulates of Boolean algebra, De Morgan's Theorems. Various identities. Formulation of truth table and Boolean equation for simple problem. Implementation of Boolean (logic) equation with gates

b) Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits

6. Arithmetic circuits (06 hrs)

a) Half adder and Full adder circuit, design and implementation.
b) Half and Full subtracter circuit, design and implementation.
c) 4 bit adder/subtracter.
d) Adder and Subtractor IC (7484)

7. Decoders, Multiplexeres and De Multiplexeres (06 hrs)

a) Four bit decoder circuits for 7 segment display and decoder/driver ICs.
b) Multiplexers and De-Multiplexers
c) Basic functions and block diagram of MUX and DEMUX. Different types and ICs

8. Latches and flip flops (06 hrs)

a) Concept and types of latch with their working and applications
b) Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops.
c) Difference between a latch and a flip flop
d) Flip flop ICs

9. Counters (8 hrs)

a) Introduction to Asynchronous and Synchronous counters
b) Binary counters
c) Divide by N ripple counters, Decade counter.
d) Pre settable and programmable counters
e) Up/down counter
f) Ring counter with timing diagram
g) Counter ICs

10. Shift Register (07 hrs)

Introduction and basic concepts including shift left and shift right.

a) Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.
b) Universal shift register
c) Buffer register, Tristate Buffer register
d) IC 7495

11. A/D and D/A Converters (08 hrs)

a) Working principle of A/D and D/A converters
b) Brief idea about different techniques A/D conversion and study of :
   - Stair step Ramp A/D converter
   - Dual Slope A/D converter
   - Successive Approximation A/D Converter
c) Detail study of :
   - Binary Weighted D/A converter
   - R/2R ladder D/A converter
d) Performance characteristics of A/D and D/A converter.
e) Applications of A/D and D/A converter.

LIST OF PRACTICALS

1. Basic logic operations, AND, OR, NOT functions

2. Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) and Exclusive NOR(EXNOR) gates

3. - Realisation of logic functions with the help of NAND or NOR gates
   - Design of a NOR gate latch and verification of its operation

4. To design a half adder using XOR and NAND gates and verification of its operation
   Construction of a full adder circuit using XOR and NAND gates and verify its operation

5. 4 bit adder, 2's complement subtractor circuit using an 4 bit adder IC and an XOR IC and verify the operation of the circuit.

6. To design a NOR Gate Latch and verification of its operation

7 Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch , D flip-flop, JK flip-flops).

8. Verification of truth table for encoder and decoder ICs, Mux and DeMux

9. To design a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation.

10. To design a 4 bit ring counter and verify its operation.

11. Asynchronous Counter ICs

    Verification of truth table for any one universal shift register IC
    Use of IC 7490 or equivalent TTL (a) divide by 2 (b) divide by 10 Counter

OR

Use of IC 7493 or equivalent TTL (a) divide by 2 (b) divide by 8 (c) divide by 16 counter

Note: Above experiments may preferably be done on Bread Boards.

INSTRUCTIONAL STRATEGY

The digital systems in microprocessors have significant importance in the area of electronics. Adequate competency needs to be developed by giving sufficient practical knowledge in microprocessors (programming as well as interfacing), A/D, D/A Converters and other topics. Help may be taken in the form of charts, simulation packages to develop clear concepts of the subject. Programming exercises other than the tested in circulation may be given to the students.

RECOMMENDED BOOKS

1. Digital Electronics and Applications by Malvino Leach, Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi
3. Digital Electronics by Soumitra Kumar Mandal, Tata McGraw Hill Education Pvt Ltd,
4. Digital Electronics by V K Sangar , Raj Publishers, Jalandhar
5. Digital Electronics by Tokheim, Tata McGraw Hill Education Pvt Ltd,
6. Digital Fundamentals by Thomas Floyds, Universal Book Stall
7. Digital Electronics by RP Jain, Tata McGraw Hill Education Pvt Ltd, New Delhi
8. Digital Electronics by KS Jamwal, Dhanpat Rai and Co., New Delhi
9. Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala
10. Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi
11. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi
12. Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi

13. Fundamentals of Digital Electronics by Naresh Gupta, Jain Brothers, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1.	Introduction	2	5
2.	Number System	4	5
3.	Codes and Parity	4	5
4.	Logic Gates and Families	7	15
5.	Logic Simplification	6	10
6.	Arithmetic Circuits	6	10
7.	Decoders, Multiplexers and Demultiplexers	6	10
8.	Latches and Flip flops	6	10
9	Counters	8	10
10.	Shift Registers	7	10
11.	A/D and D/A Converter	8	10
Total		**64**	**100**

3.5 BASICS OF CONTROL SYSTEM

L T P
4 - 2

RATIONALE

It is pre-requisite for the students to know the various total plant controls in the process industry. An automatic control system saves manpower, reduces cost of production, increases the accuracy of the finished product and helps in mass production. The knowledge of this subject is required to have deeper grasp of the control environment/techniques as need to be studied in the forthcoming subjects e.g. process control, process instrumentation.

DETAILED CONTENTS

1. Introduction (16 hrs)

   Basic elements of control system, open loop control system, closed loop control system, control system terminology, manually controlled closed loop systems, automatic controlled closed loop systems, basic elements of a servo mechanism, Examples of automatic control systems, use of equivalent systems for system analysis, linear systems, non-linear systems, control system examples from chemical systems, mechanical systems, electrical systems, introduction to laplace transform.

2. Transfer function (12 hrs)

   Transfer function analysis of ac and dc servomotors synchros, stepper motor, ampledyne. ac position control system, magnetic amplifier.

3. Control system representation (12 hrs)

   Transfer function, block diagram, reduction of block diagram, problems on block diagram, Mason's formula signal flow graph

4. Time Response Analysis (12 hrs)

   Standard test signals, time response of first and second-order system, time constant, time response of second order system, time response specifications, steady-state errors and error constants, problems in first and second order system.

5. Stability (12 hrs)

   Routh Hurwitz Criterion, Root Locus, Bode Plotting using semi log graph paper

LIST OF PRACTICALS

1. Study of characteristic of servomotor

2. Characteristics and speed control of a stepper motor
3. To demonstrate the synchro characteristic and use a synchro pair as error detector
4. Measurement of speed control of motor with tachometric feed back.
5. Study of a DC speed control system
6. Simulation of a position control system with PC
7. Study of ON-OFF controller

INSRUCTIONAL STRATEGY

Since the knowledge of this subject is required to have deeper grasp of the control environment/techniques as need to be studied in the forthcoming subjects e.g. process control, process instrumentation, the subject teacher is required to make the subject interesting and provide information about practical applications. The students may be given exposure in process industry and shown various controls.

RECOMMENDED BOOKS

1) Control Systems by Nagrath and Gopal
2) Control Systems Engineering by Bhattacharya, Pearson Education, Sector 62, Noida
3) Control Systems: Theory and Applications by Ghosh, Pearson Education, Sector 62, Noida
4) Control Systems by KUO
5) Control Systems by Ogata

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Introduction	16	25
2.	Transfer function	12	15
3.	Control System Representation	12	20
4.	Time Response Analysis	12	20
5.	Stability	12	20
Total		**64**	**100**

3.6 COMPUTER PROGRAMMING AND APPLICATIONS

L	T	P
2	-	4

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 (4 hrs)

    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 (22 hrs)

    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 Functions

    2.10 Concept of pointers, structures and Files

3. Computers application overview (6 hrs)

Demonstration of various applications software related Instrumentation and Control Engineering such as:
Matlab, Allenbradely, SLC 100 on PLCs, DCS software etc.

LIST OF PRACTICALS

1. Creating database.
2. Querying the database.
3. Report generation.
4. Programming in dbase
5. Use Instrumentation and Control Engineering related CAI packages Drawing etc.
6. Programming for Data Acquisition System and control.
7. Exercises on data acquisition.
8. Exercises on control - on/off switch, and proportional control.
9. Programming exercise on executing C program
10. Programming exercise on editing C program
11. Programming exercise on defining variables and assigning values to variables.
12. Programming exercise on arithmetic and relational operators.
13. Programming exercise on arithmetic expressions and their evaluation.
14. Programming exercise on reading a character.
15. Programming exercise on writing a character.
16. Programming exercise on formatting input using print.
17. Programming exercise on formatting output using scan.
18. Programming exercise on simple if statement.
19. Programming exercise on IF .... else statement.
20. Programming exercise on switch statement.
21. Programming exercise on go to statement.
22. Programming exercise on do-while statement.
23. Programming exercise on for statement.
24. Programming exercise on one-dimensional arrays.
25. Programming exercise on two-dimensional arrays.
26. Exercises on
    - Internet use/application
    - Typical application of various application softwares such as MATLAB, PSIM, MULTISIM, PSPICE etc. in the field of instrumentation and control engineering.

INSTRUCTIONAL STRATEGY

This is a highly practical and self-study oriented courses. The teachers are expected to explain the theoretical part and then immediately test the student's writs and run the programme based on that topic and read world problems.

RECOMMENDED BOOKS

1. Programming in C by Balaguru Swamy, Tata McGraw Hill, New Delhi
2. Computer programming and applications by Chandershekhar, Unique International Publications, Jalandhar
3. Programming in C by Schaum Series, McGraw Hills
4. The essentials of Computer Organizing and Architecture by Linda Null and Julia Labur, Narosa Publishing House Pvt. Ltd., New Delhi
5. Programming in C by Kerning Lan and Riechie Prentice Hall of India, New Delhi
6. Let us C – Yashwant Kanetkar, BPB Publications, New Delhi
7. Vijay Mukhi Series for C and C++
8. Elements of C by MH Lewin, Khanna Publishers, New Delhi
9. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi
10. Programming in C by Kris A Jansa, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi
11. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	**Time Allotted (hrs)**	**Marks Allocation**
1.	Information Storage and Retrieval	4	10
2.	Programming in C	22	70

3.	Computers Application Overview	6	20
Total		**32**	**100**

ECOLOGY AND ENVIRONMENTAL AWARENESS CAMP

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

This is to be organized at a stretch for 3 to 4 days. Lectures will be delivered on following broad topics. There will be no examination for this subject.

1. Basics of ecology, eco system and sustainable development

2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table

3. Sources of pollution - natural and man made, their effects on living and non-living organisms

4. Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms

5. Pollution of air-causes and effects of man, animal, vegetation and non-living organisms

6. Sources of noise pollution and its effects

7. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods, methods of vermicomposting

8. Mining, blasting, deforestation and their effects

9. Legislation to control pollution and protect environment

10. Environmental Impact Assessment (EIA), Elements for preparing EIA statements

11. Current issues in environmental pollution and its control, Global warming
. Green house gases, non-conventional sources of energy, introduction to clean technology.

12. Introduction to Green buildings, site selection, material efficiency, energy efficiency, water efficiency, building form.