ELECTRONICS AND COMMUNICATION ENGINEERING
(For J&K State)

VARIOUS SUBJECTS IN SECOND YEAR

THIRD SEMESTER

FOURTH SEMESTER

3.1 ELECTRONIC DEVICES AND CIRCUITS

L	T	P	Cr
4	-	2	5

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 (10 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 (10 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, collector efficiency and Distortion in class A,B,C
   d) Single ended power amplifiers, Graphical method of calculation (without derivation) of out put power; heat dissipation curve and importance of heat sinks. 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 without emitter bypass capacitor
   e) Emitter follower amplifier and its applications

4. Sinusoidal Oscillators (10 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 (no mathematical derivation but only simple numerical problems)

5. Tuned Voltage Amplifiers (04 hrs)

   a) Series and parallel resonant circuits and bandwidth of resonant circuits

   b) 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 problems on these circuits

7. Multivibrator 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 IC 555 its working and applications.

8. Opto Electric Devices (06 hrs)

   Working principles and characteristics of photo resistors, photo diodes, photo transistors, LED, LCD and opto couplers.

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 single ended power amplifier .
3. To measure the gain of push-pull amplifier.

4. To measure the voltage gain of RC Coupled amplifier with and without bypass capacitor.
5. To measure the voltage gain of emitter follower circuit and plot its frequency response
6. To observe and measure frequency of Hartley / Colpitts Oscillator on oscilloscope.
7. To observe and measure frequency of phase shift and wein bridge Oscillator on oscilloscope.
8. To plot the frequency response curve of a tuned voltage amplifier.
9. To observe the output waveforms of series and shunt clipping circuits
10. To observe the output for clamping circuits
11. To observe the output waveform of a astable/Monostable/Bistable multivibrator

INSTRUCTIONAL STRATEGY

This subject being of fundamental importance for diploma holders in electronics engineering and related fields, emphasis on conceptual understanding may be given by taking the help of charts, simulation packages etc. Sufficient exercises may given to the students in single stage and multi-stage amplifier circuits in addition to simple exercises in fabricating and testing of various simple d.c circuits. The students may be encouraged to perform some additional practical exercises apart from the list provided.

LIST OF RECOMMENDED BOOKS

1. Basic Electronics and Linear Circuits by NN Bhargava et. al., 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 SK Sahdev, Dhanpat Rai and Co, 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, Jyoteesh Malhotra and Harish C. Saini, Eagle Prakashan, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Percentage Weightage	Marks Allocation
1.	Multistage Amplifiers	10	15.6	15
2.	Large Signal Amplifier	10	15.6	15
3.	Feedback in Amplifier	08	12.5	15
4.	Sinusoidal Oscillators	10	15.6	15
5.	Tuned Voltage Amplifiers	4	6.25	5
6.	Wave Shaping Circuits	4	6.25	5
7.	Multivibrator Circuits	8	12.5	15
8.	Opto Electric Devices	6	9.37	10
Total		**64**	**100**	**100**

3.2 ELECTRONIC INSTRUMENTS AND MEASUREMENTS

L	T	P	Cr
4	-	2	5

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, the students will study various parameters on different instruments.

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. Ammeter and Voltmeter (08 hrs)

   Introduction, Types of instruments, construction, Multi-range ammeters and voltmeters, Effects of Temp. changes in ammeter and voltmeter, Errors

3. Ohm meter (06 hrs)

   Definition, series type ohmmeter, Shunt type ohmmeter.

4. Multimeter (04 hrs)

   Electronic multimeter, its block diagram, advantage over conventional multimeter.

   Principles of measurement of direct current and voltage , alternating voltage and current (moving cont and moving iron type instruments) Limitations with regards to frequency and Impedance.

5. Cathode Ray Oscilloscope (08 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 (08 hrs)

   Explanation of block diagram specifications of low frequency and RF generators, pulse generator, function generator

   Distortion factor meter; wave analyzer and spectrum analyzer

7. Impedance Bridges and Q Meters (9 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 (12 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

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 Digital storage oscilloscope(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 and signature analyser.

INSTRUCTIONAL STRATEGY

The subject requires both theory and practical emphasis simultaneously, so that the student can understand the practical significance of the various areas. Visits to instrumentation and communications industries must be carried out, so as to make the students can understand where and how the various instruments are used in the industry.

RECOMMENDED BOOKS

1. Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai & Co, Delhi
2. Electronics Instrumentation by Cooper, Prentice Hall of India, New Delhi
3. Electronics Test and Instrumentation by Rajiv Sapra, Ishan Publications, Ambala
4. Electronics Instrumentation by JB Gupta, Satya Prakashan, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	*Topic*	Time Allotted (hrs)	Percentage Weightage	Marks Allocation
1.	Basics of Measurements	4	6.25	10
2.	Ammeter and voltmeter	8	12.5	10
3.	Ohmmeter	6	9.37	15
4.	Multimeter	4	6.25	10
5.	Cathode Ray Oscilloscope	8	12.5	5
6.	Signal Generators and Analysis Instruments	8	12.5	10
7.	Impedance Bridges and Q Meters	9	14.06	10
8.	Digital Instruments	12	18.75	15
Total		64	100	100

3.3 PRINCIPLES OF COMMUNICATION ENGINEERING

L	T	P	Cr
4	-	2	5

RATIONALE

The study of principles of communication systems leads to further specialized study of audio and video systems, line communications and microwave communication systems. Thus the diploma-holder in Electronics and Communication Engineering shall find employment in areas of R and D, production, servicing and maintenance of various communication systems.

The students should understand the advantage and limitations of various analog and digital modulation systems on a comparative a scale and relate to them while studying practical communication systems.

DETAILED CONTENTS

1. Introduction (04 hrs)

   a) Need for modulation frequency translation and demodulation in communication systems

   b) Basic scheme of a modern communication system.

2. Amplitude modulation (06 hrs)

   a) Derivation of expression for an amplitude modulated wave. Carrier and side band components. Modulation index. Spectrum and BW of AM Wave. Relative power distribution in carrier and side bands.

   b) Elementary idea of DSB-SC, SSB-SC, ISB and VSB modulations, their comparison, and areas of applications

3. Frequency modulation (06 hrs)

   a) Expression for frequency modulated wave and its frequency spectrum (without Proof and analysis of Bessel function) Modulation index, maximum frequency deviation and deviation ratio, BW and FM signals, Carson's rule.

   b) Effect of noise on FM carrier. Noise triangle, Role of limiter, Need for pre-emphasis and de-emphasis, capture effect.

   c) Comparison of FM and AM in communication systems

4. Phase modulation (04 hrs)

   Derivation of expression for phase modulated wave, modulation index, comparison with frequency modulation.

5. Principles of Modulators (10 hrs)

Working principles and typical application as:

- Square Law Modulator
- Switching Modulator
- Collector modulator
- Base Modulator
- Balanced Modulator
- Ring Modulator

6. Principles of FM Modulators (06 hrs)

Working principles and applications of reactance modulator, varactor diode modulator, VCO and Armstrong phase modulator. Stabilization of carrier for using AFC Block diagram approach).

7. Demodulation of AM Waves (06 hrs)

a) Principles of demodulation of AM wave using diode detector circuit; concept of Clipping and formula for RC time constant for minimum distortion (no derivation)

b) Principle of demodulation of AM Wave using synchronous detection.

8. Demodulation of FM Waves (06 hrs)

a) Basic principles of FM detection using slope detector

b) Principle of working of the following FM demodulators

- Foster-Seeley discriminator
- Ratio detector
- Quadrature detector
- Phase locked Loop (PLL) FM demodulators

9. AM/FM Transmitters (06 hrs)

a) Classification of transmitters on the basis of modulation, service, frequency and power
b) Block diagram of AM transmitters and working of each modulation, service, stage
c) Block diagram and working principles of reactance FET and Armstrong FM transmitters

10. AM/FM Radio Receivers (10 hrs)

a) Principle and working with block diagram of super hetrodyne of AM receiver. Function of each block and typical waveforms at input and output of each block

b) Performance characteristics of a radio receiver sensitivity, selectivity, fidelity S/N ratio, image rejection ratio and their measurement procedure. ISI standards on radio receivers (brief Idea)

c) Selection criteria for intermediate frequency (IF). Concepts of simple and delayed AGC

d) Block diagram of an FM receiver, function of each block and waveforms at input and output of different blocks. Need for limiting and de-emphasis in FM reception
Block diagram of communication receivers, differences with respect to broadcast receivers.

LIST OF PRACTICALS

1. a) To observe an AM wave on CRO produced by a standard signal generator using internal and external modulation

   b) To measure the modulation index of the wave obtained in above practical

2. a) To obtain an AM wave from a modulator circuit and observe waveforms

   b) To generate a DSB-SC signal and observe the pattern on CRO for different levels of modulating signal

3. To obtain an FM wave from FM Modulator Circuit and measure the frequency deviation for different modulating signals.

4 To obtain modulating signal from an AM detector circuit and observe the pattern for different RC time constants and obtain its optimum value for least distortion.

5. To obtain modulating signal from a FM detector (Foster Seely/Ratio detector /Quadrature) circuit and plot the discriminator characteristics.

6. To plot the sensitivity characteristics of a radio receiver and determination of the frequency for maximum sensitivity

7. To plot the selectivity characteristics of a radio receiver

8. To plot the fidelity characteristics of a radio receiver

9. To align AM broadcast radio receiver

INSTRUCTIONAL STRATEGY

The subject requires both theory and practical emphasis simultaneously, so that the student can understand the practical significance of the various areas. Visits to instrumentation and communications industries must be carried out, so as to make the students can understand where and how the various instruments are used in the industry.

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
8. Principles of Communication Engineering by Roody , Coolin

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	*Topic*	Time Allotted (hrs)	Percentage Weightage	Marks Allocation
1.	Introduction	4	6.25	5
2.	Amplitude modulation	6	9.37	10
3.	Frequency modulation	6	9.37	10
4.	Phase modulation	4	6.25	5
5.	Principles of Modulators	10	15.6	15
6.	Principles of FM Modulators	6	9.37	10
7.	Demodulation of AM Waves	6	9.37	10
8.	Demodulation of FM Waves	6	9.37	10
9	AM/FM Transmitters	6	9.37	10
10.	AM/FM Radio Receivers	10	15.6	15
Total		**64**	**100**	**100**

3.4 DIGITAL ELECTRONICS

L	T	P	Cr
4	-	2	5

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.
   c) Need and process of A/D and D/A conversion

2. Number System (04 hrs)

   a) Binary 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 (04 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.

5. Logic Simplification (08 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. Logic Families (08 hrs)

a) 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

b) Logic Circuits
- Open collector, wired OR and totem pole output circuit operation (qualitative) for a TTL NAND gate
- C MOS circuit operation for a standard gate (NOR)

7. Arithmetic circuits (04 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)

8. Encoders and Decoders (04 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

9. Latches and flip flops (o6 hrs)

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

10. Counters (06 hrs)

a) Binary counters
b) Divide by N ripple counters (including design), Decade counter.
c) Pre settable and programmable counters
d) Down counter, up/down counter
e) Synchronous counters(only introduction)
f) Difference between Asynchronous and Synchronous counters
g) Ring counter with timing diagram
h) Counter ICs

11. Shift Register (06 hrs)

a) Introduction and basic concepts including shift left and shift right.

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

12. Memories (04 hrs)

Basic RAM cell, N × M bit RAM, Expansion of word length and capacity, static and dynamic RAM, basic idea of ROM, PROM, EPROM and EEPROM.

LIST OF PRACTICALS

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

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

3. Construction of 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

4. 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.

5. Construction of Nor Gate Latch and verification of its operation

6 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, edge triggered JK and master slave JK flip-flops).

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

8. Construction of a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation.
9. Construction and testing of a 4 bit ring counter .
10. Verification of truth table for any one universal shift register IC

Use of IC 7490 or equivalent TTL (a) divide by2 (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

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 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 and 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
10. 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)**	**Percentage Weightage**	**Marks Allocation**
1.	Introduction	2	3.12	5
2.	Number System	4	6.25	5
3.	Codes and Parity	4	6.25	10
4.	Logic Gates	4	6.25	10
5.	Logic Simplification	8	12.5	10
6.	Logic Families	8	12.5	10
7.	Arithmetic Circuits	4	6.25	10
8.	Encoders and Decoders	4	6.25	5
9	Latches and Flip flops	6	9.37	10
10.	Counters	6	9.37	10
11.	Shift Registers	6	9.37	10
12.	Memories	4	6.25	5
Total		**64**	**100**	**100**

3.5 ELECTRONIC DESIGN AND FABRICATION TECHNIQUES

L	T	P	Cr
2	-	4	4

RATIONALE

The purpose of this subject is to give practice to the student in elementary design of simple electronic circuits like power supplies, square wave generators ,amplifiers and oscillators. PCB fabrication techniques have been introduced with a view to make the students familiar with the conventional and modern fabrication techniques.

DETAILED CONTENTS

1. Estimation of Small Projects for fabrication for the given Specifications (8 hrs)

   1.1 Tracing and drawing of small electronic circuits.
   1.2 Making list of material
   1.3 Cost and pricing of components and material
   1.4 Estimation of total project

2. PCB Fabrication Techniques (16 hrs)

   2.1 Printed Circuit Boards (PCBs)

   (a) PCB board materials and their characteristics .
   (b) Taped Art work and inked Art Work
   (c) Photo processing and photo lithography.
   (d) Etching , Buffing and drilling.
   (e) Assembly of circuits on PCB'S
   (f) Soldering of components.
   (g) Plating Corrosion and its prevention.

3. Introduction to Modern Fabrication Techniques. (8 hrs)

   3.1 PCB design using any software package like smart work , protel, eagle, orcad, Pcad or any equivalent software package available

   3.2 Concept of plated through holes and SMDs

   3.3 Multilayer PCBs

   3.4 Study of different Electronic device Packages(BGA,PLCC,TQFP)

   3.5 Modern Soldering Techniques like Wave soldering ,flow soldering .

INSTRUCTIONAL STRATEGY

As the subject is mostly of practical nature, sufficient exercises on circuits design and circuits study should be given to students. Exercises on design of small electronic circuits should be given to the students. Theory inputs should also be given to the students as per the requirement of the topic. Field visits may be arranged for showing PCB design and fabrication.

LIST OF RECOMMENDED BOOKS

1. Printed circuit Board by Bosshart

2. Electronic Fabrication Techniques by Rajesh Kumar, NITTTR, Chandigarh

3. Module on CAD for PCBs using EAGLE software by Rajesh Kumar, NITTTR, Chandigarh

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	***Topic***	**Time Allotted (hrs)**	**Percentage Weightage**	**Marks Allocation**
1.	Estimation of Small Projects for the given Specification	8	25	25
2.	PCB Fabrication Techniques	16	50	50
3.	Introduction to Modern Fabrication Techniques	8	25	25
Total		**32**	**100**	**100**

3.6 COMPUTER PROGRAMMING AND APPLICATIONS

L	T	P	Cr
2	-	4	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 (20 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 (4 hrs)

   3.1 Commercial and business data processing application

   3.2 Engineering computation

   3.3 CAD, CAM, CAE, CAI

4. Typical Applications: (4 hrs)

   Use of various application software available in the field of Electronics Engineering

LIST OF PRACTICALS

1. Creating database.
2. Querying the database.
3. Report generation.
4. Programming in dbase
5. Use of and electrical engineering related CAI packages.
6. Programming for DAS 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 on Electronics and Communication 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)**	**Percentage Weightage**	**Marks Allocation**
1.	Information Storage and Retrieval	4	12.5	15
2.	Programming in C	20	62.5	70
3.	Computer application overview	4	12.5	10
4.	Typical applications	4	12.5	5
Total		**64**	**100**	**100**