



उत्तराखण्ड प्राविधिक शिक्षा परिषद् रुड़की (हरिद्वार)

पता: सुनेहरा रोड (निकट-के. एल. पालीटेक्निक छात्रावास), काशीपुरी -247 667

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सेवा में,

समस्त प्रधानाचार्य/निदेशक
परिषद् से सम्बद्ध समस्त
डिप्लोमा इंजीनियरिंग संस्थान।

पत्रांक 1311 / पाठ्यचर्या / आई.आर.डी.टी. / 2013-14 दिनांक 12 / 07 / 2013

महोदय,

उत्तराखण्ड प्राविधिक शिक्षा परिषद् की दिनांक 24 जून 2013 को हुई शैक्षणिक समिति की बैठक में दिये गये सुझावों को समावेश करते हुए अध्यक्ष शैक्षणिक समिति द्वारा तृतीय/चतुर्थ सैमिस्टर हेतु अनुमोदित पाठ्यचर्या सत्र 2013-14 से लागू की जानी है।

परिषद् से सम्बद्ध समस्त संस्थान नवीन पाठ्यचर्या लागू करना सुनिश्चित करें, आगामी सैमिस्टर परीक्षाएं संशोधित नवीन पाठ्यचर्या से ही करायी जाएगी।

संलग्नक - तृतीय/चतुर्थ सैमिस्टर इंजीनियरिंग ब्रान्चों की नवीन पाठ्यचर्या।

(हरि सिंह)

सचिव

सूचना

तृतीय एवं चतुर्थ सेमेस्टर के विभिन्न इंजीनियरिंग पाठ्यक्रमों की संशोधित पाठ्यचर्या सुझावों आमंत्रण हेतु परिषद् की वेबसाइट पर प्रसारित की गई थी। तदनुसार प्राप्त उपयोगी सुझावों को विशेषज्ञ समूह के साथ मंथन के उपरान्त पाठ्यचर्या में समाहित कर दिया गया है। सत्र 2013-14 से लागू की जाने वाली इंजीनियरिंग पाठ्यक्रम हेतु तृतीय एवं चतुर्थ सेमेस्टर की पाठ्यचर्या परिषद् की वेबसाइट पर प्रसारित की जा रही है। पाठ्यचर्या में यदि कहीं पर spelling/ Evaluation sheet या अन्य कोई त्रुटि हों तो कृपया अधोहस्ताक्षरी की E-mail : rpgupta0106@gmail.com पर अवगत कराने का कष्ट करें।

(आर०पी०गुप्ता)
संयुक्त सचिव
आई०आर०डी०टी०

UTTARAKHAND BOARD OF TECHNICAL EDUCATION,
ROORKEE

CURRICULUM
FOR
DIPLOMA PROGRAMME IN
ELECTRONICS ENGINEERING
FOR UTTARAKHAND
(Third & Fourth Semester Only)



Approved by:

UTTARAKHAND BOARD OF TECHNICAL EDUCATION
ROORKEE
247 667

STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN ELECTRONICS ENGINEERING

THIRD SEMESTER

Sr. No	Subject	L	T	P	T O T	EVALUATION SCHEME						Total Marks
						Internal Assessment		External Assessment (Examination)				
						Theory	Practical	Theory		Practical		
						Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
3.1	Electrical Engineering and Machines	3	1	4	8	25	20	75	2.5	50	3.0	170
3.2	Analog Electronics	3	1	4	8	25	20	75	2.5	50	3.0	170
3.3	Digital Electronics	4	1	4	9	25	20	75	2.5	50	3.0	170
3.4	Communication Engineering	4	1	4	9	25	20	75	2.5	50	3.0	170
3.5	Electronics Workshop- cum-Minor Project	0	0	4	4	-	20	-	-	80	3.0	100
3.6	Computer Programming Using C	2	0	4	6	25	20	75	2.5	50	3.0	170
General Proficiency #		-	-	4	4	-	25	-	-	-	-	25
Industrial Exposure (Assessment at Inst. Level) +		-	-	-	-	-	25	-	-	-	-	25
Total		16	4	28	48	125	170	375	-	330		1000

General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS and cultural activities, elementary mathematics, GS & G.K etc.

+ Industrial visit compulsory at minimum 2 Industries or Department.

Note: 1- Each period will be 50 minutes.

2- Each session will be of 16 weeks.

3- Effective teaching will be at least 12.5 weeks.

FOURTH SEMESTER (ELECTRONICS ENGINEERING)

Sr. No	Subject	L	T	P	T O T	EVALUATION SCHEME						Total Marks
						Internal Assessment		External Assessment (Examination)				
						Theory	Practical	Theory		Practical		
						Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
4.1	Electronics Circuits	4	0	4	8	25	20	75	2.5	50	3.0	170
4.2	Microprocessor and its applications	3	1	4	8	25	20	75	2.5	50	3.0	170
4.3	Electronic Measuring Instruments	3	1	4	8	25	20	75	2.5	50	3.0	170
4.4	Network Filters and Transmission Lines	3	1	4	8	25	20	75	2.5	50	3.0	170
4.5	Signal Sensing and Conditioning	4	0	3	7	25	20	75	2.5	50	3.0	170
4.6	Entrepreneurship Development and Management*	5	0	0	5	25	-	75	2.5	-	-	100
4.7	Industrial Training	Industrial Training of 30 days done after 4 th Semester would be evaluated in 5 th semester through Report and Viva-voice.										
General Proficiency #		-	-	4	4	-	25	-	-	-	-	25
Industrial Exposure (Assessment at Inst. Level) +						-	25	-	-	-	-	25
Total		22	3	23	48	150	150	450	-	250	-	1000

* Common with other Engineering diploma programmes.

General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS and cultural activities, elementary mathematics, GS & G.K etc.

+ Industrial visit compulsory at minimum 2 Industries or Department.

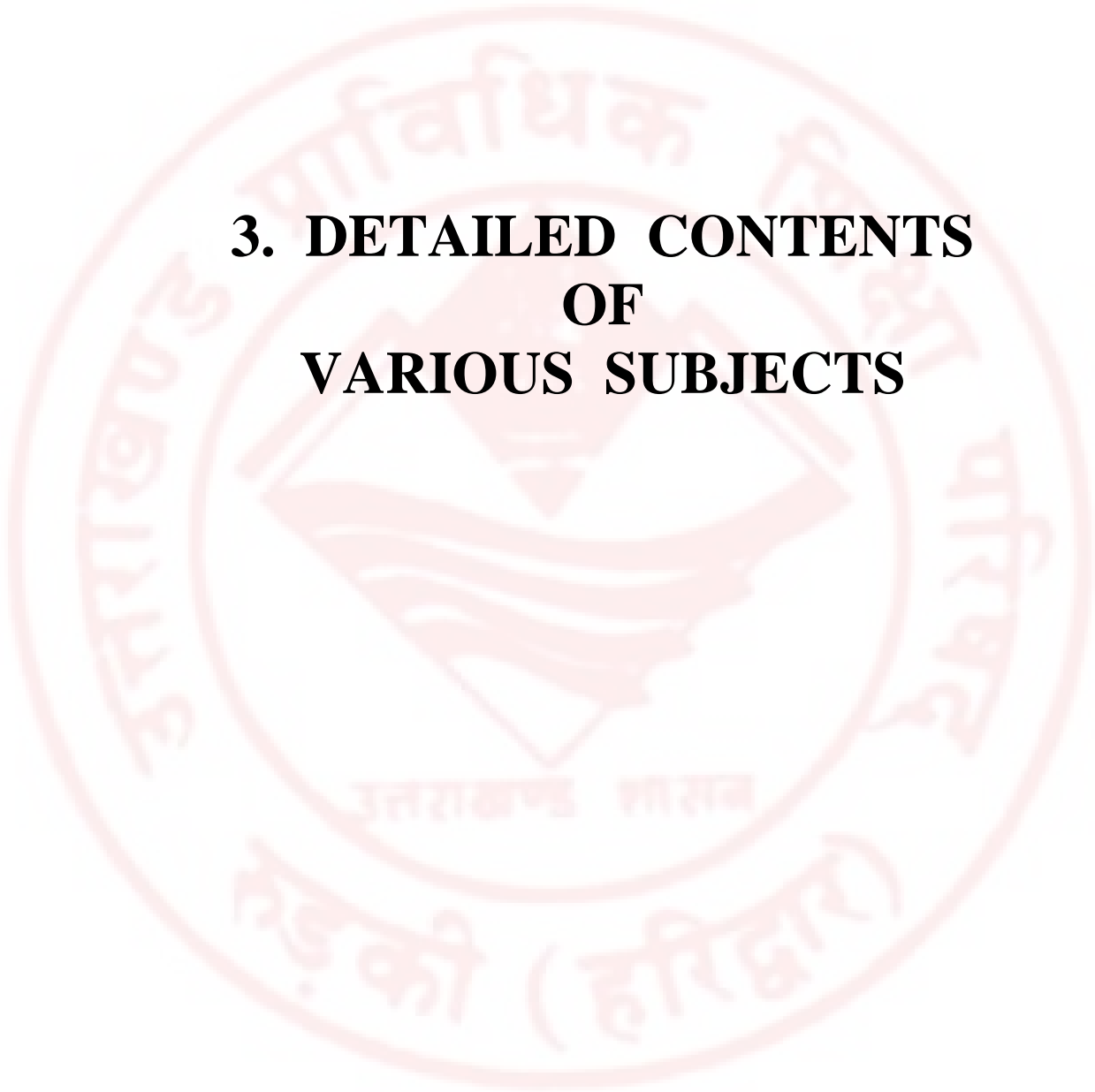
Note: 1- Each period will be 50 minutes.

2- Each session will be of 16 weeks.

3- Effective teaching will be at least 12.5 weeks.

The logo of Uttarakhand State Open University is a circular emblem. It features a central diamond shape containing a stylized mountain range. Below the mountains are several horizontal wavy lines. The text 'उत्तराखण्ड प्राविधिक राज्य' is written along the top inner edge of the circle, and 'परिषद्' is on the right. At the bottom, 'उत्तराखण्ड शासन' is written above 'देहरादून (हरिद्वार)'.

THIRD SEMESTER



3. DETAILED CONTENTS OF VARIOUS SUBJECTS

3.1 ELECTRICAL ENGINEERING AND MACHINES

L T P
Periods/week 3 1 4

RATIONALE :For a diploma holder, it becomes imperative to know the fundamentals of the electrical engineering in order to grasp the knowledge of the field. This subject will provide acquaintance with various terms, knowledge of fundamental concepts of electricity, and various motors and machines.

DETAILED CONTENTS

1. **Over view of DC Circuits** (08 period)
 - Basic concept of AC & DC
 - Applications of Kirchoff's Laws in solving electrical network problems.
 - Network theorem such as superposition, Thevenin theorem, Norton theorem and maximum power transfer theorem.
 - Star-delta transformation

2. **AC fundamentals** (10 period)
 - Concept of alternating current, and voltage, equation of instantaneous values.
 - Representation of alternating sinusoidal quantities by phasors
 - Power in pure resistance, inductance, capacitance. RL, RC, RLC circuits
 - Active and reactive components of current and their significance
 - Power factor and its practical significance
 - Resonance in series and parallel circuits
 - Active power reactive power, apparent power

3. **Three phase supply** (10period)
 - Advantage of three phase system over single phase system
 - Star –delta connection
 - Relation between phase voltage and line voltage, also between phase current and line current in a 3 phase system
 - Power and power factor in 3 phase system

4. **Transformer** (10 period)

Working principle of a Transformer, constructional features, 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. Losses in a transformer, cooling of transformer

5. **Electrical Machines** (16 Period)

Principles of electromechanical energy conversion,
DC Machines: Types, e.m.f. equation of generator and torque equation of motor, construction characteristics and applications of dc motors, speed control of DC motor.
Single Phase Induction Motor: Principle of operation and construction brief of single phase motor introduction to methods of starting, applications.

Three Phase Induction Motor: Types, constructional brief & Principle of operation, Slip-torque characteristics, speed control and starting methods

Three Phase Synchronous Machines: Constructional brief & Principle of operation of alternator and synchronous motor and their applications.

6. Batteries

(10Period)

- Basic idea about primary and secondary cells,
- Construction, working and applications of Lead-Acid, Nickel-Cadmium and Silveroxide batteries,
- Capacity and efficiency of lead acid battery
- Charging methods used for lead-acid battery(accumulator),
- Care and maintenance of lead-acid battery,
- Series and parallel connections of batteries,
- Testing of lead acid battery for fully charged condition and their specification
- Application of lead acid battery
- Introduction to maintenance free batteries.

LIST OF PRACTICALS

1. Familiarization of measuring instruments viz. voltmeter, ammeter, wattmeter and other accessories
2. To measure (very low) resistance of an ammeter and (very high) resistance of a voltmeter
3. To verify in d.c. circuits
 - Thevenin's theorem
 - Norton's theorem
 - Super Position Theorem
 - Maximum Power Transfer Theorem
4. To find a voltage current relationship in a single phase R-L and R-C Series circuits, draw their impedance triangles and determination of the power factor in each case.
5. To determine effect of a single phase transformer from the data obtained through open circuit and short circuit test.
6. To connect the primary and secondary winding of a three phase transformer and to verify line and phase current and voltage relationship respectively.
7. To connect a dc shunt motor with supply through a 3 point starter and to run the motor at different speeds with the help of a field regulator.
8. To run a 3 phase induction motor with the help of a star- delta starter. To change the direction of rotation of the motor.
9. To run a synchronous motor with a.c. supply and to measure speed to verify the relation $N = 120f/p$.
10. To test a lead – acid storage battery for charged & discharged condition (with hydrometer & to recharge it)

INSTRUCTIONAL STRATEGY

The teacher should give emphasis on understanding of concept and various terms used in the subject. Practical exercises will reinforce various concepts.

RECOMMENDED BOOKS

1. Basic Electrical and Electronics Engineering by SK Sahdev ,Dhanpat Rai and CO, New Delhi.
2. Electrical Science by Choudhury S; Narosa Publishing House Pvt. Ltd. Daryaganj New Delhi.
3. Basic Electrical and Electronics Engineering by Kumar KM , Vikas Publishing House Pvt Ltd. Jangpura, New Delhi.
4. Basic Electrical Engineering by Mool Singh ,Galgotia Publication Pvt. Ltd. New Delhi.
5. Electrical Technology by BL Theraja, S Chand and Co, New Delhi.
6. Principles of Electrical Engineering by BR Gupta , S Chand and Co, New Delhi.
7. Basic Electrical Engineering by PS Dhogal , Tata McGraw Hill , New Delhi.
8. Basic Electrical Engineering by JB Gupta ; SK Kataria and Sons , New Delhi.
9. Electrical Machine by SK Bhattacharya , Tata McGraw Hill, New Delhi.
10. Electrical Machine by SK Sahdev , Unique International Publications, Jalandhar.
11. Electrical Machine by Nagrahand Kothari, Tata McGraw Hill, New Delhi.
12. Electrical Engineering by JB Gupta , SK Kataria & Sons , New Delhi.
13. Electrical Machines by P. S. Bhimbra.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (period)	Marks Allocation(%)
1	08	15
2	10	15
3	10	15
4	10	15
5	16	25
6	10	15
Total	64	100

3.2 ANALOG ELECTRONICS

L T P

Periods/week 3 1 4

RATIONALE

This subject will enable the student to have conceptual understanding of conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers in electronics, understanding of filters in rectifiers, tunnel diodes, LEDs, varactor diodes, LCD, understanding the working of transistors in various configuration; understanding of FETs and MOSFET etc. For effective functioning in the field of electronics service industry. The teacher should give emphasis on understanding of concepts and explanation of various terms used in the subject. Practical exercises will reinforce various concepts. Industrial/field exposures must be given by organizing visit to local electronic industries.

DETAILED CONTENTS

1. Semi conductor Physics (12 period)
 - Review of basic atomic structure and energy level, concept of insulator, conductors and semi conductors, atomic structure of Ge and Si, covalent bonds
 - Concept of intrinsic and extrinsic semiconductor, P and N impurities, doping of impurity
 - P and N type semiconductors and their conductivity. Effect of temperature on conductivity of intrinsic semi conductor
 - Energy level diagram of conductors, insulators and semi conductors, minority and majority carriers
 - Basic idea of Hall Effect and its uses

2. Semi Conductor Diode (12 period)
 - PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, depletion layer, forward and reverse biased PN junction, potential barrier, concept of junction capacitance in forward and reverse bias condition
 - V-I characteristics, static and dynamic resistance and their calculation from diode characteristics
 - Diode as half wave, full wave and bridge rectifier. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC filter and π filter
 - Type of diodes, characteristics and applications of Zener diode. Zener and avalanche breakdown, use of Zener diode as a voltage regulator

3. Introduction to Bipolar Transistor (12 period)

Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow; current relations in transistor; concept of leakage current; CB, CE, CC configuration of the 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, Power rating of Transistor

4. Transistor Biasing Circuits (6 period)

Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits, Load line Analysis, Concept of AC load Line, Stability Factor

5. Single Stage Transistor Amplifier (10 period)

Classification of Amplifier

Single stage transistor amplifier circuits, a.c load line and its use in calculation of currents 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. Calculation of current gain, voltage gain, input impedance and output impedance using h-parameter

6. FET, MOSFET & UJT (12 period)

Construction, operation and characteristics of FET and its application

- Construction, operation and characteristics of MOSFET in depletion and enhancement modes and its applications
- C-MOS advantages and applications
- Comparison of JFET, MOSFET and BJT
- FET amplifier circuit and its working principle. (No analysis)
- Construction, operations and application of UJT.

LIST OF PRACTICALS

1. Familiarization, identification and testing of active and passive components.
2. Familiarization with operations of different Electronics instruments like analog & digital Multi-meter, CRO, Signal generator, Regulated Power Supply
3. To plot V-I characteristics of PN junction diode
4. To plot V-I characteristics of a zener diode & observe its use as voltage regulator
5. To observe the wave shape of following rectifier circuit
 - Half wave rectifier
 - Full wave rectifier
 - Bridge rectifier
6. To plot the wave shape of full wave rectifier with
 - Shunt capacitor filter
 - Series capacitor filter
 - π filter
7. To plot input and output characteristics and calculate parameter of transistor in CE configuration

8. To plot input and output characteristics and calculate parameter of transistor in CB configuration
9. To plot V-I characteristics of FET Transistor
10. To measure the Q-point and note the variation of Q- point
 - By increasing the base resistance in fixed biased circuit
 - By changing out of bias resistance in potential driver circuit
11. To measure voltage gain, input, output impedance in single stage CE amplifier circuits
12. To Plot the V-I Characteristics of UJT & use of UJT as relaxation oscillator.

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. 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 and Kulshreshta, Tata McGraw Hill, New Delhi.
2. Electronics Devices and circuits by D.C. Kulshreshtha; New Age Publishers, New Delhi.
3. Principle of Electrical and Electronics Engineering by VK Mehta; S Chand and Co. New Delhi.
4. Electronics Components and Materials by SM Dhi, Tata McGraw Hill, New Delhi.
5. Electronics Device and circuits by Millman and Halkias; McGraw Hill.
6. Principle of Electronics by Albert Paul Malvino; Tata McGraw Hill.
7. Electronics Devices and circuits-I by Naresh Gupta, Jyotesh Malhotra and Harish CSaini, Eagle Prakashan, Jalandhar.
8. Electronics Devices .and circuits by Rama Reddy, Narosa Publishing House Pvt.Ltd. New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Period)	Marks Allocation
1.	12	15
2.	12	20
3.	12	20
4.	06	10
5.	10	15
6.	12	20
Total	64	100

3.3 DIGITAL ELECTRONICS

L T P
Periods/week 4 1 4

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 period)
 - Comparison between analog and digital signal
 - Applications and advantages of digital signals
2. Number System (04period)
+ (01 T)
 - Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa
 - 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 (05period)
+ (01 T)
 - Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code
 - Concept of parity, single and double parity and error detection code.
4. Logic Gates and Families (06period)
+ (02 T)
 - 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
 - Characteristics of TTL and C MOS digital gates. Delay, speed, noise margin, logic levels, power dissipation, fan-in, fan-out, power supply requirement and comparison between TTL and C MOS families, ECL & IIL
 - Open collector and totem pole output circuits
 - Introduction to tri- state devices, tri state buffer and Inverter circuits

5. Logic Simplification (04period)
+ (02 T)
- 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
 - Karnaugh map (upto 4 variables) and simple applications in developing combinational logic circuits
 - Concept of POS & SOP.
6. Arithmetic circuits (04period)
+ (01 T)
- Half adder and Full adder circuit, design and implementation.
 - Half and Full subtractor circuit, design and implementation.
 - 4bit binary Adder and Subtractor IC (7483)
7. Decoders, Multiplexer and De Multiplexer (07period)
+ (01 T)
- Four bit decoder circuits for 7 segment display and decoder/driver ICs.
 - Multiplexers and De-Multiplexers
 - Basic functions and block diagram of MUX and DEMUX. Different ICs
8. Latches and flip flops (06period)
+ (01 T)
- Concept and types of latch with their working and applications
 - Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops.
 - Difference between a latch and a flip flop
 - Flip flop ICs
9. Counters (06period)
+ (02 T)
- Introduction to Asynchronous and Synchronous counters
 - Binary counters
 - Divide by N ripple counters, Decade counter.
 - Up/down counter
 - Ring counter with timing diagram
 - Counter ICs
10. Shift Register (05period)
+ (01 T)
- Introduction and basic concepts including shift left and shift right.
 - Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.
 - Universal shift register
 - Buffer register, Tristate Buffer register
 - IC 7495

11. A/D and D/A Converters (06period)
+ (02 T)

- 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) Applications of A/D and D/A converter
- e) Sample and Hold Circuit

12. Memories (05period)
+ (01 T)

Memory organization, Classification of semi conductor memories. ROM, PROM, DROM, EPROM, EEPROM, RAM, CCD memories, Programmable logic devices, programmable logic array, programmable array logic

13 Arithmetic & Logic Unit (05 Periods)

+ (01 T)

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

LIST OF PRACTICALS

- 1) Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) and Exclusive NOR(EXNOR) gates
- 2) Realisation of logic functions with the help of NAND or NOR gates
- 3) To design a half adder & full adder using XOR and NAND gates and verification of its operation
- 4) Realisation of 4 bit adder/subtractor using IC
- 5) 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)
- 6) Verification of truth table for encoder and decoder ICs, Mux and DeMux
- 7) To design a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation
- 8) 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

9. To design A/D and D/A convertor and verify their operations.
10. Familiarity use of EPROM programmes
11. Verify the writing and reading operation of RAM IC
12. Verify the logic operation, arithmetic operation of ALU IC

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, DhanpatRai and Co., New Delhi.
9. Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala.
10. Digital Electronics by BR Gupta, DhanpatRai& 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

Topic	Time Allotted (period)+ Tutorial	Marks Allocation
1	02	05
2	05	10
3	05	05
4	08	10
5	06	10
6	05	05
7	08	10
8	07	10
9	08	10
10	06	05
11	08	10
12	06	05
13	06	05
Total	80	100

3.4 COMMUNICATION ENGINEERING

L T P
Periods/week 4 1 4

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, transmitters, receivers and antennas relate to them while studying practical communication systems.

DETAILED CONTENTS

1. Introduction (04 period)
 - Need for modulation, frequency translation and demodulation in communication systems
 - Basic scheme of a modern communication system
2. Amplitude modulation (05period)
+ (02 T)
 - 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
 - Elementary idea of DSB-SC, SSB-SC, ISB and VSB modulations, their comparison, and areas of applications
3. Frequency & Phase Modulation (07period)
+ (02 T)
 - 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 of signals
 - Effect of noise on FM carrier. Noise triangle, Role of limiter, Need for pre-emphasis and de-emphasis
 - Expression for phase modulated wave, modulation index
 - Comparison of Phase, FM and AM in communication systems
4. Modulators (07period)
+ (02 T)
 - a. AM Modulators
Circuit Diagram and working operation of
 - i. Collector and Base Modulator
 - ii. Square Law Modulator
 - Switching Modulator
 - Balanced Modulator
 - Ring Modulator
 - b. FM Modulators

Circuit Diagram and working of reactance modulator, varactor diode modulator, VCO and Armstrong phase modulator. Stabilization of carrier for using AFC (Block diagram approach)

- 5- Demodulators (07period)
+ (02 T)
- a. AM Demodulators
- Principles of demodulation of AM wave using diode detector circuit; concept of Clipping and formula for RC time constant for minimum distortion (no derivation)
 - Principle of demodulation of AM Wave using synchronous detection.
- b. FM Demodulators
- Basic principles of FM detection using slope detector
 - Principle of working of the following FM demodulators
 - Foster-Seeley discriminator
 - Ratio detector
 - Quadrature detector
 - Phase locked Loop (PLL) FM demodulators
- 6- Pulse Modulation (08 period)
+ (02 T)
- Statement of sampling theorem and elementary idea of sampling frequency for pulse modulation
 - Basic concepts of time division multiplexing (TDM) and frequency division multiplexing (FDM)
 - Types of pulse modulation-PAM, PPM, PWM (Generation &Detection) and their comparison
 - Pulse code Modulation (PCM) Basic scheme of PCM system. Quantization, quantization error, companding Advantages of PCM systems.
7. AM/FM Transmitters (04 period)
+ (02 T)
- Classification of transmitters
 - Block diagram and working principles of AM transmitters Reactance transmitter & Armstrong FM Transmitters.
8. AM/FM Radio Receivers (12 Period)
+ (02 T)
- Block Diagram and working principle of super heterodyne AM receiver, function of each block and typical wave at I/P and O/P of each block, Advantages of super heterodyne reception.
 - Performance characteristics of a radio receiver-sensitivity, selectivity, fidelity, S/N ratio, image rejection ratio and their measurement procedure.
 - Selection criteria of intermediate frequency (IF), Concepts of Simple and delayed AGC.
 - Block diagram of an FM receiver, function of each block and wave forms at input and output different blocks.
 - Block diagram of communication receivers, differences with respect to broadcast receivers.

9. Antennas

(10 Period)
+ (02 T)

Physical concept of radiation of electromagnetic energy from a dipole, type of propagation
Brief idea of EM wave propagation & type of propagation, Concept of polarization of EM waves, electromagnetic spectrum and its various ranges. Tropospheric scattering in brief.

- a) Definition and physical concepts of the terms with antennas like point source, gain, directivity, aperture, effective area, radiation pattern, beam angle, beam width & radiation resistance.
- b) Types of antennas : brief description, characteristics and typical applications of
 - Half wave dipole.
 - Medium wave (mast) antenna
 - Yagi & ferrite rod antenna
- c) Brief description of broadside and end fire arrays, their radiation pattern and applications (without analysis); basic concept Tropospheric scattering brief idea about rhombic antenna and disc antenna.

LIST OF PRACTICALS

1. To observe an AM wave on CRO produced by a standard signal generator using internal and external modulation & to measure the modulation index of the wave obtained
2. To obtain an AM wave from a square law modulator circuit and observe waveforms and to measure the modulation index of the obtained wave form
3. To obtain an FM wave and measure the frequency deviation for different modulating signal
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
6. To observe PAM, PPM and PWM signal and compare it with the analog input signal
7. To feed an analog signal to a PCM modulator and compare the demodulated signal with the analog input. Also note the effect of low pass filter at the demodulated output
8. To plot the sensitivity & selectivity characteristics of a radio receiver and determine the frequency of maximum sensitivity.
9. To align AM broadcast radio receiver and study different faults and radio receiver & major the Voltage at the different points of a radio receiver
10. Installation of directional antenna for best reception.
11. Installation of dish antenna for best reception.

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 System by Kennedy, Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Fundamentals of Communication System by Fitz, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Principles of Communication Engineering by Taub, Tata McGraw Hill Education Pvt Ltd,
4. Electronics Communication by KS Jamwal, Dhanpat Rai and Co, New Delhi
5. Radio Engineering by GK Mittal, Khanna Publishers, New Delhi
6. Principles of Communication Engineering by DR Arora, Ishan Publications, Ambala
7. Communication Engineering by A Kumar
8. Principles of Communication Engineering by Manoj Kumar, SatyaPrakashan, New Delhi
9. Principles of Communication Engineering by Anokh Singh, S.Chand and Co., New Delhi
10. Principles of Communication Engineering by Roody, Coolin

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (period)	Marks Allocation
1	04	07
2	07	10
3	09	10
4	09	10
5	09	10
6	10	15
7	06	08
8	14	15
9	12	15
Total	80	100

3.5 ELECTRONIC WORKSHOP CUM MINOR PROJECT

L TP

Periods/week- - 4

RATIONALE

In electronics, with theoretical knowledge the practice is also very important. Starting from identification of components to testing of different circuit the practice must be there. To identify components, To use data book, To identify leads, Use of test equipment such as multi-meter to oscilloscope, To learn the technique of soldering and de-soldering are the areas where practice is required and it makes perfect electronics engineer. Minor project work aims at exposing the students to various developments taking place in the field of electronics and related areas in addition to developing interest in the students about working and fabrication of electronics devices. The project may be selected from utility items pertain to their laboratories or homes. It would enable first hand experience of components, their purchase, assembly, testing and trouble shooting. It would also boost up confidence of the students in repairing and maintenance 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. The purpose of this subject is also to give practice to the students in elementary design and fabrication of simple electronic circuits. The topics of assembly, soldering, testing, and documentation have been included to give overall picture of the process of manufacturing of electronic devices. The teacher may guide/ help students to identify their minor project work and chalk out their plan of action well in advance preferably at the beginning of 3rd semester For this purpose, the concerned teachers must identify curriculum related industrial problems which should be expository in nature and ask students (individual/group) to carry out their investigation/activity such that enough industrial exposure is gained by them during this process.

DETAILED CONTENTS

1. Laboratory Experiences (06 period)
 - Identification of components
 - Practice for color coding of resistance
 - Practice for identification of various components such as diode, capacitors, transistors, SCR, Triac and different ICs
 - Understand the use of data book for transistors, Diodes, SCR and triac
 - Understand the use of data book for TTL and CMOS ICs
 - Testing of different components using multi-meter
2. Use of electronic instruments (08 period)
 - Practice for the use of multi-meter
 - Practice for the use of signal generator
 - Practice for the use of power supply
 - Practice for the use of oscilloscope
3. Designing the PCB layout using computer software (12 period)
 - Understanding the use of printed circuit board in electronics.
 - Designing practice of PCB layout for a simple electronics circuit such as rectifier, transistor, amplifier etc.
 - Use of software --Work bench and PSPICE

4. Soldering the PCB (05 period)
- Soldering practice for PCB
 - Soldering the PCB design in layout topic.
 - Desoldering practice
5. Testing of PCB (05period)
- After soldering the component on given PCB testing the continuity and input / output result of given circuit
6. Fault finding of electronic circuit (06 period)
- Basic idea of fault finding procedure
7. Minor Project Work (24 Period)
- Minimum 04 Project to be fabricated by each student**
Students can also select any other project with the advice of 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. FM Transmitter and Receiver
 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
 24. Triac using Fan Regulator
 25. 555 using lighting delay Circuits
 26. Temperature sensor based fabrication
 27. Design and fabricate transistor switch to operate an LED.
 28. Design and Fabricate a single stage Amplifier for 1 KHz

RECOMMENDED BOOKS

1. Data books for transistors Diodes & SCR
2. Data book for TTL and CMOS ICs
3. PCB designing Books

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (period Practical)
1	06
2	08
3	12
4	04
5	04
6	06
7	24
Total	64

3.6 COMPUTER PROGRAMMING USING C

L T P
Periods/week2 - 4

RATIONALE

Computer plays a very vital role in present day life, more so, in the professional life of Diploma engineers. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposure to various engineering applications of computers. The knowledge of C language will be reinforced by the practical exercises and demonstration of application software in the field of Electrical Engineering during the course of study. Introduction to data base management system is also a very significant field with vast employment potential.

DETAILED CONTENTS

1. Algorithm and Program Development (04 period)
 - Steps in development of a program
 - Flow-charts, algorithm development
 - Introduction to various computer languages
 - Concept of interpreter, compiler, high level language(HLL), machine language (ML) and Assembly Language
2. Program Structure (C Programming) (20 period)
 - History of 'C', data types, input output statements, arithmetic and logical operations, data assignments, precedence and associativity
 - I/O statements - Assignment, Variables, arithmetic operation- their precedence, data types standard I/O function, formulated I/O
 - Control Statements - Logical and relational operators; if-else, while, do- while, for loops, breaks, switch statements
 - Functions - Function declaration, parameter passing- by value, storage classes (Local, Global and Static variables), standard library functions
 - Arrays - Single and multi dimensional arrays, character arrays
 - Pointers - To various data types, pointers in parameters passing, pointers to function
 - Structures - Definition of a structure, pointer to structure, union and array of structure
 - Strings - String processing, functions and standard library function
 - Data files - File handling and manipulation, file reading and writing, Binary and ASCII files, file records using standard function type mouse
3. Software Applications in Electronics Engineering (08 period)

Computer application overview through various applications software related to Electronics Engineering branch viz: ORCAD & MATLAB

LIST OF PRACTICALS

1. Programming exercise on executing a C Programs
2. Programming exercise on editing a C program
3. Programming exercise on defining variables and assigning values to variables
4. Programming exercise on arithmetic and relation operators
5. Programming exercise on arithmetic expressions and their evaluation
6. Programming exercise on reading a character
7. Programming exercise on writing a character
8. Programming exercise on formatting input using print
9. Programming exercise on formatting output using scan
10. Programming exercise on simple IF statement
11. Programming exercise on IF... ELSE statement
12. Programming exercise on SWITCH statement
13. Programming exercise on GOTO statement
14. Programming exercise on DO-WHILE statement
15. Programming exercise on FOR statement
16. Programming exercise on one dimensional arrays
17. Programming exercise on two dimensional arrays
18. Basic programming and Application of the software: MATLAB & ORCAD.

INSTRUCTIONAL STRATEGY

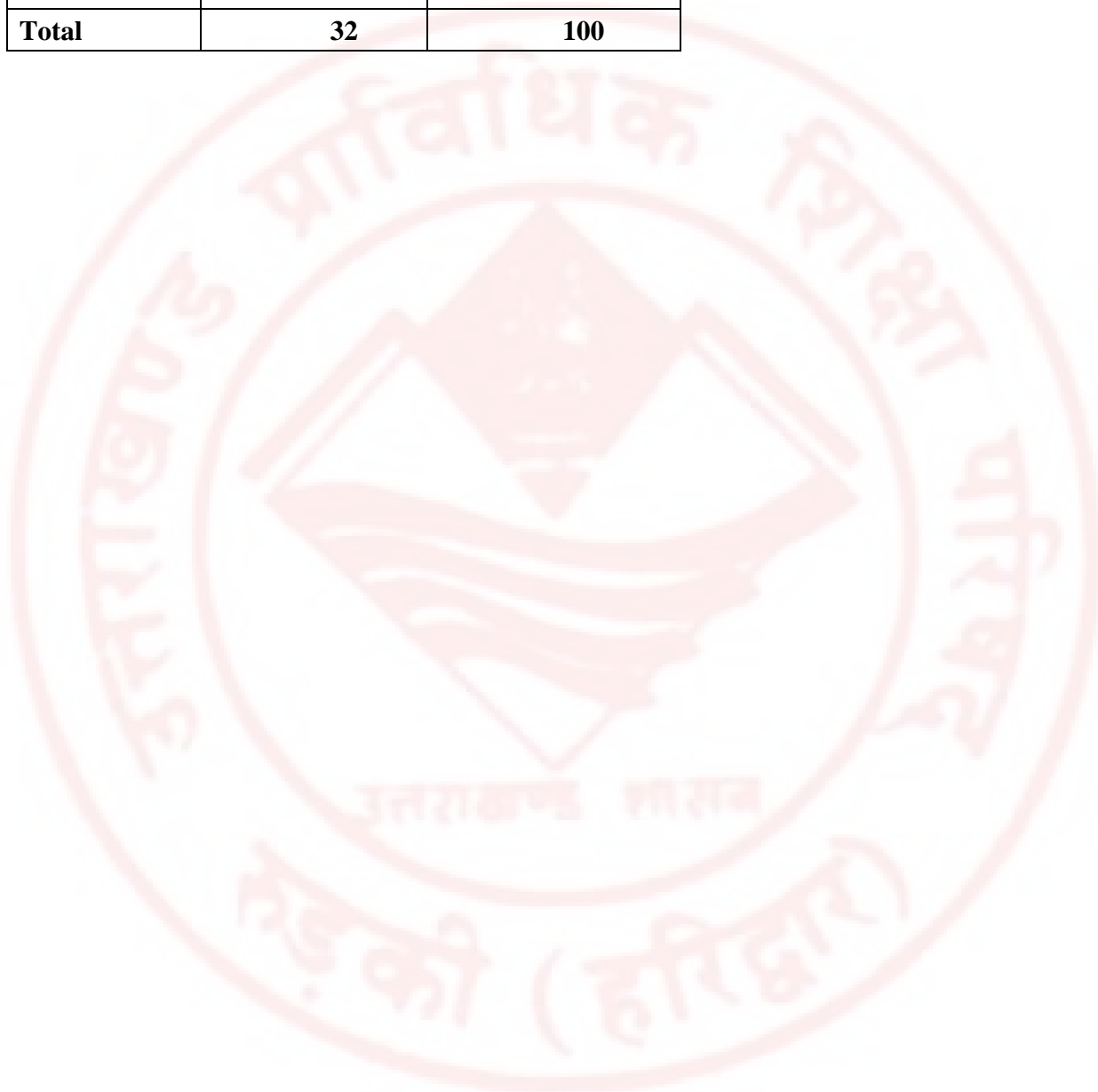
This course is a highly practical and self- study oriented courses. The teachers are expected to explain the theoretical part and ensure that the students to execute and debug different programs. The PC needs to have Turbo C.

RECOMMENDED BOOKS

1. Programming in C by Balagurusamy, Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Programming in C by Gottfried, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Programming in C by Kerning Lan and Richie; Prentice Hall of India, New Delhi
4. Let us C- YashwantKanetkar, BPB Publications, New Delhi
5. Vijay Mukhi Series for C and C++
6. Programming in C by R Subburaj, VikasPublishing House Pvt. Ltd., Jangpura, New Delhi
7. Programming in C by Kris A Jansa, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi
8. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi
9. Elements of C by MH Lewin, Khanna Publishers, New Delhi
10. The Complete Reference to Visual Basic 6, by Noel Jerke, Tata McGraw Hill Education Pvt Ltd, New Delhi
11. Web site www.Beyondlogic.org
12. Pointers in C by YashwantKanetkar, BPB Publishers New Delhi
13. Programming in Applications by Chandershekhar, Unique International Publications, Jalandhar
14. The essentials of Computer Organizing and Architecture by Linda Null and Julia Labur, Narosa Publishing House Pvt. Ltd., New Delhi

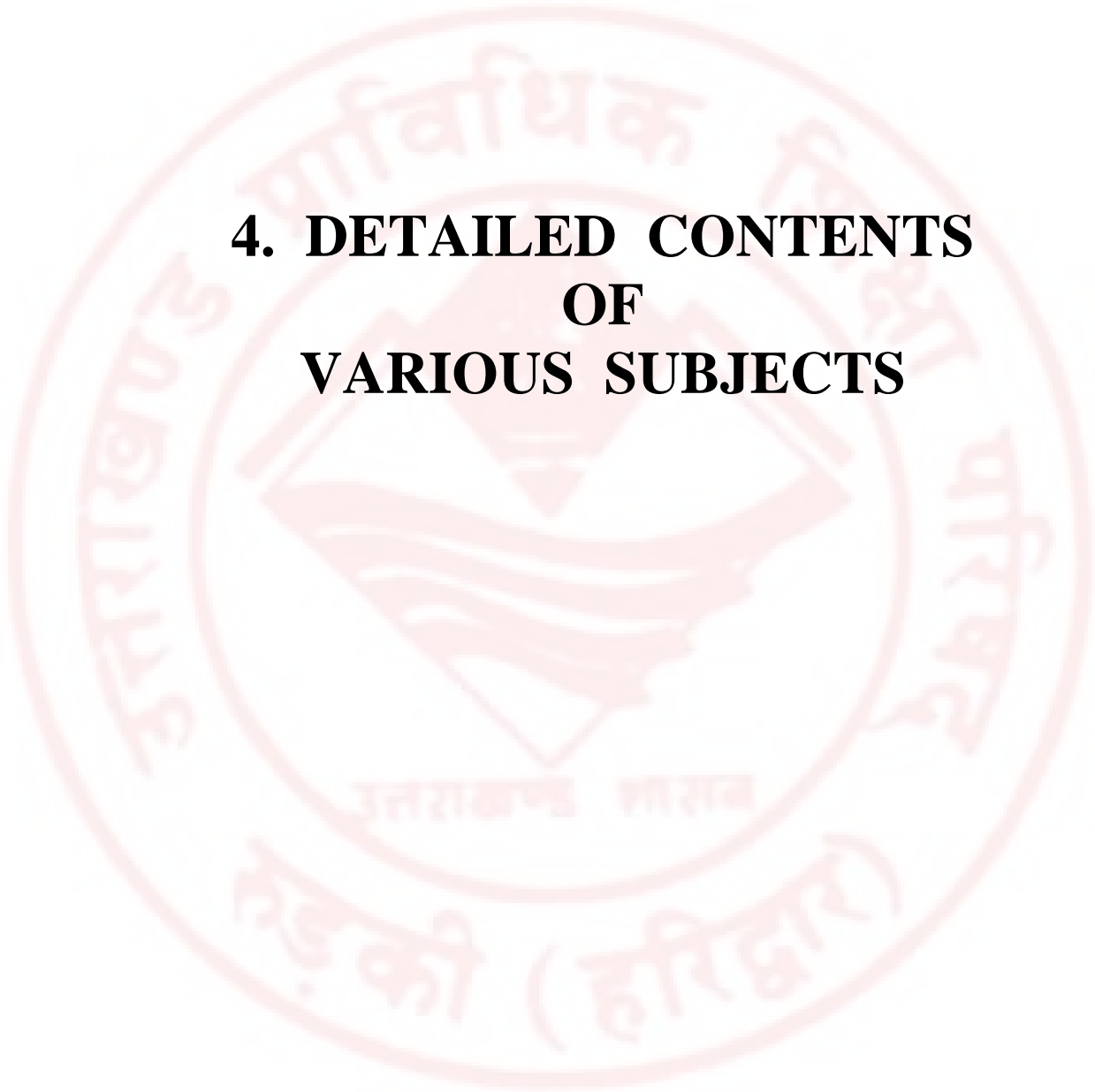
SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (period)	Marks Allocation (%)
1	04	15
2	20	70
3	08	15
Total	32	100





FOURTH SEMESTER



4. DETAILED CONTENTS OF VARIOUS SUBJECTS

4.1 ELECTRONICS CIRCUITS

L T P

Periods per week 4 – 4

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 period)
 - Need for multistage amplifier
 - Gain of multistage amplifier
 - Different types of multistage amplifier, Coupling, Comparison between different types of coupling, RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth
2. Large Signal Amplifier (08 period)
 - Difference between voltage and power amplifiers
 - Importance of impedance matching in amplifiers
 - Class A, Class B, Class AB, and Class C amplifiers, collector efficiency and Distortion in class A,B,C
 - 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
 - Concept of Thermal Runaway & its protection
3. Feedback in Amplifiers (10 period)
 - Basic principles and types of feedback
 - Derivation of expression for gain of an amplifier employing feedback
 - Effect of feedback (negative) on gain, stability, distortion and bandwidth of an amplifier
 - RC coupled amplifier with emitter bypass capacitor
 - Emitter follower amplifier and its application
 - Darlington Amplifier.

4. Sinusoidal Oscillators (08 period)
- Barkhausen criterion for oscillations
 - Tank Circuits
 - Use of positive feedback
 - Classification of oscillators
 - 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 (06 period)
- Series and parallel resonant circuits and bandwidth of resonant circuits
 - Single and double tuned voltage amplifiers and their frequency response characteristics
6. Wave Shaping Circuits (06 period)
- General idea about different wave shapers
 - RC and RL integrating and differentiating circuits with their applications
 - Diode clipping and clamping circuits and simple numerical problems on these circuits
7. Multivibrator Circuits (08 period)
- Working principle of transistor as switch
 - Concept of multi-vibrator: astable, monostable, and bistable and their applications
 - Block diagram of IC555 and its working and applications
 - IC555 as monostable and astable multi-vibrator
8. Operational Amplifiers (08 period)
- Characteristics of an ideal operational amplifier and its block diagram
 - Definition of differential voltage gain, CMRR, PSRR, slew rate and input offset current
 - Operational amplifier as an inverter, scale changer, adder, subtractor, differentiator, and integrator
 - Concept of Schmitt trigger circuit and sample/hold circuit using operational amplifier and their application

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. Use of IC 555 as monostablemultivibrator and observe the output for different values of RC
9. Use of IC 555 as astablemultivibrator and observe the output at different duty cycles
10. To use IC 741 (op-amplifier) as
 - i) Inverter,
 - ii) Adder,
 - iii) Subtractor
 - iv) Integrator
11. To realize positive and negative fixed voltage AC power supply using three terminal voltage regulator IC (7805, 7812, 7905)

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.

RECOMMENDED BOOKS

1. Basic Electronics and Linear Circuits by NN Bhargava, Tata McGraw Hill, New Delhi
2. Electronic Principles by Sahdev, DhanpatRai and Sons, New Delhi.
3. Electronics Principles by Malvino, Tata McGraw Hill, New Delhi
4. Electronic Devices and Circuits by Millman and Halkias, McGraw Hill, New Delhi
5. Electronics Devices and Circuits by BhupinderjitKaur,modern Publishers, Jalandhar
6. Basic Electronics by Grob, Tata McGraw Hill, New Delhi
7. Art of Electronics by Horowitz
8. Electronic Circuit Theory by Boylestead
9. Electronic Devices and Circuits by BL Theraja, S Chand and Co Ltd. New Delhi
10. Operational Amplifiers and Linear Integrated Circuits by Ramakant A. Gaykwad

11. Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi
12. Electronics Devices and Circuits-II by Rajesh Kumar, Eagle Prakashan, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (period)	Marks Allocation
1	10	20
2	08	15
3	10	15
4	08	15
5	06	10
6	06	05
7	08	10
8	08	10
Total	64	100

4.2 MICROPROCESSOR AND ITS APPLICATIONS

L T P

Periods per week 3 1 4

RATIONALE

The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings them face-to-face with mainframe finding employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers. Microprocessors find application in process control industry. They also form a part of the electronic switching system between source and destination in long distance telecommunications. Thus the microprocessor is an area of specialization. Students of electronics and related engineering branches often use microprocessors to introduce programmable control in their projects, in industrial training.

DETAILED CONTENTS

1. Evolution and Architecture of a Microprocessor (With reference to 8085 microprocessor)
(12 period)

Typical organization of a microcomputer system and functions of its various blocks. Concept of Bus, bus organization of 8085, Functional block diagram of 8085 and function of each block, Pin details of 8085 and related signals, Demultiplexing of address/data bus generation of read/write control signals, Steps to execute a stored programme

2. Programming (with respect to 8085 microprocessor) (16 period)

Brief idea of machine and assembly languages, Machines and Mnemonic codes, Instruction format and Addressing mode. Identification of instructions as to which addressing mode they belong. Concept of Instruction set. Explanation of the instructions of the following groups of instruction set. Data transfer group, Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group. Programming exercises in assembly language. (Examples can be taken from the list of experiments).

3. Memories and I/O interfacing (10 period)

Memory organization, Concept of memory mapping, partitioning of total memory space. Address decoding, concept of I/O mapped I/O and memory mapped I/O. Interfacing of memory mapped I/O devices. Concept of stack and its function. Basic RAM Cell, N X M bit RAM, Expansion of word length and capacity, static and dynamic RAM.

4. Instruction Timing and Cycles (08 period)

Instruction cycle, machine cycle and T-states, Fetch and execute cycle

5. Interrupts

Concept of interrupt, Maskable and non-maskable, Edge triggered and level triggered interrupts, Software interrupt, Restart interrupts and its use, Various hardware interrupts of 8085, Servicing interrupts, extending interrupt system

6. Data transfer techniques (06period)

Concept of programmed I/O operations, sync data transfer, async data transfer (hand shaking), Interrupt driven data transfer, DMA, Serial output data, Serial input data

7. Peripheral devices (06 period)

8255 PPI and 8253 PIT, 8257 DMA controller, 8279 Programmable KB/Display Interface, 8251 Communication Interface Adapter, 8155/8156

LIST OF PRACTICALS

1. Familiarization 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 subtraction 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 and D/A card in sampling, wave generation, multiplexer, de-multiplexer and 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). Help may be taken in the form of charts, simulation packages to develop clear concepts of the subject. Programming exercises other than the given in the list may be given to the students.

RECOMMENDED BOOKS

1. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi

2. Introduction to Microprocessor by Mathur, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Microprocessor and Microcontrollers by Dr B P Singh, Galgotia Publications, New Delhi
4. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd, New Delhi
5. Microprocessor and Microcomputers by Refiquzzaman, Prentice Hall of India Ltd., New Delhi
6. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi
7. Digital Electronics and Applications by Malvino Leach; Publishers McGraw Hill, New Delhi
8. Digital Integrated Electronics by Herbert Taub and Donalds Sachilling; Prentice Hall of India Ltd., New Delhi
9. Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi
10. Digital Electronics and Microprocessor by Rajiv Sapra, Ishan Publication, Ambala

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Period)	Marks Allotted (%)
1	12	20
2	16	25
3	10	15
4	08	10
5	06	10
6	06	10
7	06	10
Total	64	100

4.3 ELECTRONICS MEASURING INSTRUMENTS

L T P

Periods per week 3 1 4

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 (06 period)
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, importance and applications of standards and calibration
2. Voltage, Current and Resistance Measurement (12 period)
 - Principles of operation and construction of permanent magnet moving coil (PMMC) instruments
 - Moving iron type instruments, measurement of d.c voltage and current, measurement of d.c voltage and current, milli-volt measurement
 - Measurement of voltage, current and resistance using multimeter
 - Specifications of multimeter and its applications
 - Limitations with regard to frequency and input impedance
3. Cathode Ray Oscilloscope (10 period)
 - Construction and working of Cathode Ray Tube (CRT)
 - Time base operation and need for blanking during fly back, synchronization
 - Block diagram, description of a basic CRO and triggered sweep oscilloscope, front panel controls.
 - Specifications of CRO and their explanation.
 - Measurement of voltage, current, frequency, time period and phase using CRO.
 - CRO probes, special features of dual beam, dual trace, delay sweep.
 - Digital storage oscilloscope (DSO) : block diagram and working principle.
4. Signal Generators and Analytical Instruments (08 period)
 - Explanation of block diagram specifications of low frequency and RF generators, pulse generator, function generator
 - Wave analyzer, distortion measurement and spectrum analyser

5. Impedance Bridges and Q Meters (14 period)
- 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
6. Digital Instruments (14 period)
- 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

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 Bridge
8. Use of logic pulser and logic probe
9. Measurement of time period, frequency, average period using universal counter/frequency counter

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, DhanpatRai and Sons, New Delhi
2. Electronics Measurement and Instrumentation by Oliver, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Electronics Instrumentation by Cooper, Prentice Hall of India, New Delhi
4. Electronics Test and Instrumentation by Rajiv Sapra, Ishan Publications, Ambala
5. Electronics Instrumentation by JB Gupta, SatyaPrakashan, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Period)	Marks Allocation (%)
1	6	05
2	12	20
3	10	15
4	08	10
5	14	25
6	14	25
Total	64	100

4.4 NETWORK FILTERS AND TRANSMISSION LINES

L T P

Periods per week 3 1 4

RATIONALE

The study of networks, filters and transmission lines leads to understanding of line communication, audio and video communication, and microwave communication. Particularly the study of networks takes off from principles of a.c. theory and introduces the student 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 CONTENTS

1. Circuit Theory & Networks (20period)
 - a) Elements of Networks and its type, Current Sources, Voltage Source and their conversion, Dependent and Independent Sources, Nodal and Mesh analysis.
 - b) Two port (four terminals) network: Basic concepts of the following terms
 - Symmetrical and asymmetrical networks: Balanced and unbalanced network, T-network, π network, Ladder network; Lattice network; L-network and Bridge T-network
 - c) Symmetrical Network:
 - Concept and significance of the terms characteristic impedance, propagation constant, attenuation constant, phase shift constant and insertion loss.
 - T-network and π Network
 - d) Asymmetrical Network
 - Concept and significance of iterative impedance, image impedance, image transfer constant and insertion loss
 - The half section (L-section); symmetrical T and π sections into half sections
2. Attenuators (08period)
 - Units of attenuation (Decibels and Nepers): General characteristics of attenuators
 - Analysis and design of simple attenuator of following types; Symmetrical T and π type, L type
3. Filters (16period)
 - a) Brief idea of the use of filter networks in different communication systems, concept of low pass, high pass, band pass and band stop filters
 - b) Prototype Filter Section
 - Impedance characteristics vs frequency characteristics of a low and high pass filter and their significance

- Attenuation Vs frequency; Phase shift Vs frequency, characteristics impedance vs frequency of T and JI filters and their significance
 - Simple design problems of prototype low pass section.
- c) M-Derived Filter Sections - Limitation of prototype filters, need of m-derived filter
 - d) Crystal Filters - Crystal and its equivalent circuits, special properties of piezoelectric filters and their use
 - e) Active Filters - Basic concept of active filters and their comparison with passive filters
4. Transmission Lines (20period)
- Transmission Lines, their types and applications.
 - Distributed constants, T and JI representation of transmission line section.
 - Definition of characteristic impedance, propagation constant, attenuation constant and phase shift constant.
 - Concept of infinite line
 - Condition for minimum distortion and minimum attenuation of signal on-the-line and introduction to loading methods.
 - Concept of reflection and standing waves, definition of reflection coefficient, SWR & VSWR and their relation (no derivation).
 - Transmission line equation, expression for voltage, current and impedance at a point on the line.
 - Concept of transmission lines at high frequencies.
 - Introduction to stubs. (single, open and short stubs).

LIST OF PRACTICALS

1. To measure the characteristic impedance of symmetrical T and JI networks
2. To measure the image impedance of a given asymmetrical T and JI networks
3. For a prototype low pass filter:
 - Determine the characteristic impedance experimentally
 - Plot the attenuation characteristic
4. To design and measure the attenuation of a symmetrical T/ JI type attenuator
5. For a prototype high pass filter:
 - Determine the characteristic impedance experimentally
 - To plot the attenuation characteristic
6. a) To plot the Impedance characteristic of a prototype band-pass filter
 b) To plot the attenuation characteristic of a prototype band pass filter
7. a) To plot the impedance characteristic of m- derived low pass filter
 b) To plot the attenuation characteristics of m-derived high pass filter
8. To observe the information of standing waves on a transmission line and measurement of SWR and characteristic impedance of the line
9. Draw the attenuation characteristics of a crystal filter

INSTRUCTIONAL STRATEGY

Stress should be laid on problems in networks/ filter and transmission lines. Practical must be carried out after completion of topic to gain a good know how on the subject students should be given home assignments on various topics, stress on making own circuit models to calculate input/output impedance, characteristic impedance, losses etc. should be carried out by the students.

RECOMMENDED BOOKS

1. Network Lines and Fields by John D Ryder; Prentice Hall of India, New Delhi
2. Network Filters and Transmission Lines by AK Chakarvorty; DhanpatRai and Co. Publication, New Delhi
3. Network Analysis by Van Valkenburg; Prentice Hall of India, New Delhi
4. Network Analysis by Soni and Gupta; DhanpatRai and Co. Publication, New Delhi
5. Network Theory and Filter Design by Vasudev K. Aatre
6. Network Filters and Transmission line by UmeshSinha
7. Electrical and Electronics Measuring instrumentation , A.K Sawhney, DhanpatRai and Co. Publication, New Delhi
8. Network Analysis by G.K. Mithal
9. Network Filters and Transmission line by NardeepGoyal, Rajneesh Kumari, Tech. Max Publication, Pune.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (period)	Marks Allocation (%)
1	20	32
2	08	12
3	16	24
4	20	32
Total	64	100

4.5 SIGNAL SENSING AND CONDITIONING

L T P

Periods per week 4 03

RATIONALE

This subject provides knowledge about signals, sensing of signals, signal transmission, conditioning and recording.

DETAILED CONTENTS

1. Introduction (04 Periods)
 - Signal
 - Types of Signals
 - Functional Elements of System
 - Importance of Sensing of Signals

2. Sensing Elements (24 Periods)
 - Resistive sensing elements: potentiometers, resistance thermometers, strain gauges, Load cell/Pressure cell
 - Capacitive sensing elements: variable separation, area and dielectric
 - Inductive sensing elements: variable reluctance and LVDT displacement sensors
 - Electromagnetic sensing elements: velocity sensors
 - Thermoelectric sensing elements: laws, thermocouple characteristics, installation problems
 - Elastic sensing elements : sensing elements for force, torque, acceleration, pressure
 - Piezoelectric sensing elements: static and dynamic characteristics
 - Electrochemical sensing elements: ion selective electrodes, solid state gas sensors
 - Photo sensing elements : Basic principle and characteristics of photo sources and photo detector, photo resistors, photo diodes, photo transistors, photo electric cells, LCDs, LEDs and photocouplers, LDR
 - Photo Detectors : Optical detection Principles, Electro-optic effect, Integrated Optical Devices, Magneto optic effect, Acousto-optic effect
 - Digital Transducer element, Micro sensor, smart sensors

3. Signal Transmission (12 Periods)
 - Introduction

- Methods of Data Transmission
- General Telemetry System
- Types of Telemetry Systems
- Land Line Telemetering System
- Voltage Telemetering Systems
- Current Telemetering System
- Position Telemetering System
- Land Line Telemetering
- Feed-back System
- Radio Frequency (R.F.) Telemetry

4. Signal Conditioning (07 Periods)

- Basic Instrumentation Amplifier
- Applications of Instrumentation Amplifiers (Specific Bridge)
- Chopped and Modulated DC Amplifier

6. Signal Recording and Display (10Periods)

- Recording Requirements
- Analog Recorders
- Graphics Recorders
- Strip Chart Recorders
- Types of Strip Chart Recorders
- Galvanometer Type Recorders
- Null Type Recorders
- Potentiometric Recorders
- X-Y Recorders
- Direct Recording
- Digital Display Methods
- Digital Display Units
- Segmental Displays
- Dot Matrices
- Rear Projection Display

7. Data Acquisition System (07 Periods)

- Introduction
- Objective of DAS
- Single Channel Acquisition System
- Multi-Channel DAS
- Computer Based DAS
- Data Loggers
- Sensors Based Computer Data Systems

LIST OF PRACTICALS

1. Measurement of Displacement using LVDT
2. Measurement of Temperature using Thermocouple & Thermister
3. Measurement of Strain using strain gauge

4. Application of Load Cell/Pressure Cell
5. Application of capacitive transducer
6. Application of Potentiometer
7. Application and use of LDR, Photocell
8. Application of Potentiometer recording
9. Application and use of graphic and strip chart recorder
10. Use of Telemetry System

INSTRUCTIONAL STRATEGY

The teaching should be supplemented by using audio visual aids.

RECOMMENDED BOOKS

1. Electronic Instrumentation; by H.S.Kalsi; McGraw-Hill Education India Pvt.Ltd.
2. Principles of Measurement Systems by John P.Bently (Pearson)
3. Electrical and Electronic Measurements and Instrumentation by A.K.Sawhney; DhanpatRai& Co.
4. Instrumentation measurement and Analysis by B.C. Nakra, K.K.Chaudhary
5. Optoelectronics An Introduction to Materials and Devices by Singh Jasprit; McGraw Hill
6. Instrumentation Devices and Systems by C.S.Ranjan; Tata McGraw Hill

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Period)	Marks Allocation (%)
1	04	08
2	24	32
3	12	15
4	07	10
5	10	15
6	07	10
Total	64	100

4.6 ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

L T P
Periods per week 5 - -

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

DETAILED CONTENTS

SECTION – A ENTREPRENEURSHIP

1. Introduction (23 periods)
 - Concept /Meaning and its need
 - Qualities and functions of entrepreneur and barriers in entrepreneurship
 - Sole proprietorship and partnership forms of business organisations
 - Schemes of assistance by entrepreneurial support agencies at National, State, District level: NSIC, NRDC, DC:MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP)

2. Market Survey and Opportunity Identification (17 periods)
 - Scanning of business environment
 - Salient features of National and State industrial policies and resultant business opportunities
 - Types and conduct of market survey
 - Assessment of demand and supply in potential areas of growth
 - Identifying business opportunity
 - Considerations in product selection

3. Project report Preparation (14 periods)
 - Preliminary project report
 - Detailed project report including technical, economic and market feasibility
 - Common errors in project report preparations
 - Exercises on preparation of project report

SECTION –B MANAGEMENT

4. Introduction to Management (06 periods)
- Definitions and importance of management
 - Functions of management: Importance and Process of planning, organising, staffing, directing and controlling
 - Principles of management (Henri Fayol, F.W. Taylor)
 - Concept and structure of an organisation
 - Types of industrial organisations
 - a) Line organisation
 - b) Line and staff organisation
 - c) Functional Organisation
5. Leadership and Motivation (05 periods)
- a) Leadership
- Definition and Need
 - Qualities and functions of a leader
 - Manager Vs leader
 - Types of leadership
- b) Motivation
- Definitions and characteristics
 - Factors affecting motivation
 - Theories of motivation (Maslow, Herzberg, McGregor)
6. Management Scope in Different Areas (10 periods)
- a) Human Resource Management
- Introduction and objective
 - Introduction to Man power planning, recruitment and selection
 - Introduction to performance appraisal methods
- b) Material and Store Management
- Introduction functions, and objectives
 - ABC Analysis and EOQ
- c) Marketing and sales
- Introduction, importance, and its functions
 - Physical distribution
 - Introduction to promotion mix
 - Sales promotion

d) Financial Management

- Introductions, importance and its functions
- Elementary knowledge of income tax, sales tax, excise duty, custom duty and VAT

7. Miscellaneous Topics (05 periods)

a) Customer Relation Management (CRM)

- Definition and need
- Types of CRM

b) Total Quality Management (TQM)

- Statistical process control
- Total employees Involvement
- Just in time (JIT)

c) Intellectual Property Right (IPR)

- Introductions, definition and its importance
- Infringement related to patents, copy right, trade mark

Note: In addition, different activities like conduct of entrepreneurship awareness camp extension lecturers by outside experts, interactions sessions with entrepreneurs and industrial visits may also be organised.

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment or seminar method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organisations on visit. Approach extracted reading and handouts may be provided.

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi
3. Entrepreneurship Development in India by CB Gupta and P Srinivasan; Sultan Chand and Sons, New Delhi
4. Entrepreneurship Development - Small Business Enterprises by Poornima M Charantimath; Pearson Education, New Delhi
5. Entrepreneurship : New Venture Creation by David H Holt; Prentice Hall of India Pvt. Ltd., New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Principles and Practice of Management by L M Prasad; Sultan Chand & Sons, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Pds)	Marks Allotted (%)
1	23	28
2	17	20
3	14	16
4	6	10
5	5	06
6	10	14
7	5	06
Total	80	100

4.7 INDUSTRIAL TRAINING

Industrial training provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

For this purpose, students at the end of fourth semester need to be sent for industrial training for a minimum of 4 weeks duration to be organised during the semester break starting after IV Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A teacher may guide a group of 4-5 students. A minimum of one visit by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

Internal assessment and external assessment have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behaviour, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry, if any. The components of evaluation will include the following.

- | | |
|--------------------------------------|-----|
| a) Punctuality and regularity | 15% |
| b) Initiative in learning new things | 15% |
| c) Relationship with workers | 15% |
| d) Industrial training report | 55% |