CURRICULUM

for

DIPLOMA PROGRAMME

in

ELECTRONICS & COMMUNICATION ENGINEERING

2nd Year (3rd & 4th Semester)

FOR THE STATE OF HIMACHAL PRADESH

Prepared by
National Institute of Technical Teachers Training & Research,
Sector-26, Chandigarh-160019, India.

June, 2018

General Guidelines for Curriculum Implementation

1. Weightage for the internal assessment in respect of theory subjects will be as follow:
   - House Test: 40 %
   - Class Test: 20%
   - Home Assignment: 20%
   - Attendance: 20%
2. There will be two class tests in every semester and the average of the two tests will be taken into account.
3. The syllabus for the class tests will be as under:
   - Class Test-I: 30 % of syllabus
   - Class Test-II: next 30 % of syllabus
4. Class Test-I should be conducted in first week of March/September.
5. Class Test-II should be conducted in the second week of April/October.
6. The 30%, 60% and 80% contents of the syllabus will be based on the number of hours allocated for the topics in the detailed curriculum of each subject.
7. The question paper for both the class tests will be of 30 marks each and of one-hour duration.
8. Improvement test can be conducted after every class test on the basis of some genuine reason to be judged by the Head of concerned Department.
9. There will be one house test in the First week of May/November and syllabus converge will be 80%.
10. The house test will be of total 60 marks and the duration of House Test should be two hours.
11. There will be minimum two home assignments per subject per semester.
12. Weightage for the internal assessment in respect of Practical subjects should be: Practical Performance: 60% and Viva Voce : 40%
13. Weightage for Internal Assessment in respect of Drawing subjects will be as under:
    i. House Test and Class Test = 40%
    ii a) Class performance/Drawing Sheets=40%
    ii b) Attendance/punctuality = 10%
    ii c) Viva = 10%

    For iia), iib), iic) marks should be given in each drawing sheet by concerned teacher during evaluation.
14. It is suggested that students may be taken for industrial visits for industrial exposure in second year and third year.
15. **Student Centered Activities**: A provision has been made for organizing Student Centered Activities for overall personality development of students. SCA will comprise co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, cultural activities and participation in programs like technical and cultural events etc.

Distribution of marks for SCA will be as follows:

i. 20% marks shall be given for general behaviour

ii. 20% marks for attendance shall be based on the following distribution:

Attendance	Marks
Less than 65%	Nil
More than 65%	Proportionate

iii. 60% Marks shall be given for the Sports/NCC/Cultural and Co- curricular activities/other activities after due consideration to the following points:

1. For participation in sports/NCC/Cultural/ Co-curricular activities at National or above level, shall be rewarded with minimum of 40% marks
2. For participation in sports/NCC/Cultural/Co-curricular activities at Inter-polytechnic level, shall be rewarded with minimum of 30% marks
3. For participation in two or more of the listed activities, 20% extra marks should be rewarded

Note: These marks are to be sent to the H.P. Takniki Shiksha Board, Dharamsala at the end of semester along with internal assessment.

STUDY AND EVALUATION SCHEME
THIRD SEMESTER ELECTRONICS & COMMUNICATION ENGINEERING

SR. NO	SUBJECTS	STUDY SCHEME Hrs/Week		MARKS IN EVALUATION SCHEME								Total Marks
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		Th	**Pr**	Th	**Pr**	**Total**	**Th**	**Hrs**	**Pr**	**Hrs**	**Total**	
3.1	Electronic Devices & Circuits -I	4	2	30	20	50	100	3	50	3	150	200
3.2	Network Filters and Transmission Lines	4	2	30	20	50	100	3	50	3	150	200
3.3	*Digital Electronics	4	2	30	20	50	100	3	50	3	150	200
3.4	Principles of Communication Engineering	4	2	30	20	50	100	3	50	3	150	200
3.5	Electronic Instrument and Measurement	4	2	30	20	50	100	3	50	3	150	200
3.6	Electronic Design & Simulation Techniques-I	-	6	-	50	50	-	-	50	3	50	100
#Student Centered Activities		-	4	-	25	25	-	-	-	-	-	25
Total		20	20	150	175	325	500	-	300	-	800	1125

* Common with. Diploma in Electrical Engineering , EEE

STUDY AND EVALUATION SCHEME

FOURTH SEMESTER ELECTRONICS & COMMUNICATION ENGINEERING

SR. NO.	SUBJECTS	STUDY SCHEME **Hrs/Week**		MARKS IN EVALUATION SCHEME								**Total Marks**
				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		Th	**Pr**	**Th**	**Pr**	**Total**	**Th**	**Hrs**	**Pr**	**Hrs**	**Total**	
4.1	Electronic Devices and Circuits-II	4	2	30	20	50	100	3	50	3	150	200
4.2	* * Microprocessor and Programming	4	2	30	20	50	100	3	50	3	150	200
4.3	Power Electronics	4	2	30	20	50	100	3	50	3	150	200
4.4	Communication System	4	2	30	20	50	100	3	50	3	150	200
4.5	Audio & Video Systems	4	2	30	20	50	100	3	50	3	150	200
4.6	Electronic Design & Simulation Techniques-II	-	6	-	50	50	-	3	50	3	50	100
#Student Centered Activities		-	4	-	25	25	-	-	-	-	-	25
Total		20	20	150	175	325	500	-	300	-	800	1125

** Common with Diploma in Electrical Engineering

Industrial Training - After examination of 4th Semester, the students shall go for training in a relevant industry/field organisation for a minimum period of 4 weeks and shall prepare a diary. The students shall also prepare a report at the end of training and shall present it in a seminar, which will be evaluated during 5th semester.

3.1 ELECTRONIC DEVICES & CIRCUITS-I

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RATIONALE

Having attained basic knowledge of Semiconductor Physics in Second semester, this course will enable the students to learn about the use of transistors in analog circuits like voltage amplifier, power amplifier, multistage amplifier, etc. It also gives information about FET, MOSFETs, and their applications for effective functioning in the field of electronic service industry.

1. Concept of Voltage and Current Source (3 Hrs)

Concept of Voltage & Current Sources, Conditions for source to act as voltage source and current source, Graphical representation of voltage and current sources, difference between ideal and practical voltage and current sources, conversion of voltage source into current source and vice-versa.

2. Review of Basic Electronics: **(**7 Hrs.)

P-N Junction theory, Semiconductor Diode and its Characteristics (Forward/reverse), Zenor Diode, Zenor Diode as Voltage Regulator.

3. Transistor (16 hrs)

Transistor: Constructional Features of Transistor (PNP & NPN Type), Working Principle of Transistor, Working of Transistor as an Amplifier, Concept of Transistor biasing and selection of operating point,. Need for stabilization of operating point. Potential divider biasing Circuit.

Configurations of Transistor: Common Base (CB), Common Emitter (CE), Common Collector (CC), Input/Output Characteristics of Transistor in CB, CE & CC Modes

Transistor as an amplifier in CE Configurations, Concept of DC load line and operating point. Performance characteristics of transistor amplifier i.e. input resistance, output resistance, effective collector load, current gain, voltage gain & power gain, Explanation of phase reversal of output voltage with respect to input voltage and its graphical demonstration, Concept of AC load line.

4. Multistage Amplifiers (10 hrs)

Need for multistage amplifier; Gain of multistage amplifier; Different types of multistage amplifier: RC coupled, Transformer coupled, Direct coupled amplifier-: their frequency response, bandwidth and applications.

5 Large Signal Amplifiers **(**08 hrs)

Difference between Voltage & Power Amplifier, Importance of Impedance matching , Classification of Amplifiers: Class A, Class B, Class AB, Class C, Push Pull Amplifier, Complementary symmetry Push-Pull Amplifier.

6. Feedback in Amplifiers (8 hrs)

Types of feedbacks in amplifier, Derivation of expression for gain of an amplifier employing negative feedback. Effect of negative feedback on gain, input & output impedance ,distortion and bandwidth.

RC coupled amplifier circuit without emitter bypass capacitor, Emitter follower circuit.

7. Field effect transistors (FET) (04 hrs)

Construction, working principle and V-I characteristics of FET and MOSFET, Comparison between BJT, FET and MOSFET in terms of their features and applications. CMOS.

LIST OF PRACTICALS

1. To identify various types of electronic components such as resistors, capacitors, inductors, diodes & transistors and to identify the terminals of diodes & transistor using multimeter.
2. To plot the V-I characteristics of semiconductor diode
3. To plot the V-I characteristics of Zenor diode.
4. To plot input and output characteristics of transistor in CE configuration. Calculate input and output resistance and voltage gain.
5. To measure the voltage gain of two stages RC coupled amplifier.
6. To plot the frequency response of two stages RC coupled amplifier & calculate the bandwidth.
7. To study and measure the voltage gain of Push-Pull Amplifier Circuit
8. To measure the voltage gain of emitter follower circuit.
9. To measure the gain of RC Coupled Amplifier Circuit with and without the emitter bypass capacitor.
10. To plot the V-I characteristics of FET.

1. LIST OF RECOMMENDED BOOKS

- Basic Electronics and Linear Circuits by NN Bhargava, Tata McGraw Hills, New Delhi
- Electronic Principles by Sahdev, Dhanpat Rai and Sons, New Delhi.
- Electronic Devices and Circuits by Millman and Halkias, McGraw Hills, New Delhi
- Art of Electronics by Horowitz
- Electronic Circuit Theory by Boylste
- Electronic Devices and Circuits by BL Theraja, S Chand and Co Ltd. New Delhi
- Operational Amplifiers and Linear Integrated Circuits by Ramakant A. Gaykwad

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Topic	Time Allotted	Marks Allocation%
1	Concept of Voltage & Current Sources	3	5
2	Review of Basic Electronics	7	12
3	Transistors	16	26
4	Multistage Amplifiers	10	20
5	Large Signal Amplifiers	8	18
6	Feedback in Amplifiers	8	13
7	Field effect transistors	4	06
Total		**56**	**100**

3.2 NETWORK FILTERS AND TRANSMISSIONLINES

RATIONALE

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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. Networks (18 hrs)

1.1Two 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

1.2 Symmetrical Network: -Concept and significance of the terms characteristic impedance, propagation constant, attenuation constant, phase shift constant and insertion loss, T-network; π-Network

1.3 Asymmetrical Network-Concept and significance of iterative impedance, image Impedance, Image transfer constant and insertion loss.

2. Attenuators (06hrs)

2.1 Units of attenuation (Decibels and Nepers): General characteristics of attenuators.
2.2Analysis and design of simple attenuator of following types; Symmetrical T and Π type.

3. Filters (18hrs)

3.1 Brief idea of the use of filter networks in different communication systems, Concept of low pass, high pass, band pass and band stop filters.

3.2 Analysis of prototype Low and High pass (T and π) filter.

3.3 Impedance characteristics v/s frequency characteristics of a low and high pass filter and their significance.

3.4 Attenuation vs. frequency, Phase shifts frequency, Characteristics impedance Vs. frequency of T and π Low and High pass filters and their significance.

3.5 Simple design problems of prototype low & high pass section.
3.6 Limitation of prototype filters, need of m-derived filters. Brief idea of m-derived Low and High filter (T and π) section.
3.7 Crystal Filters; Crystal and its equivalent circuit; Special properties of piezoelectric filters and their use.

4. Transmission Lines (14hrs)

4.1 Transmission Lines, their types and applications.

4.2 Distributed constants , T and π representation of transmission line section.

4.3 Definition of characteristic impedance, propagation constant, attenuation constant and phase shift constant.

4.4 Condition for minimum distortion and minimum attenuation of signal on the-line and introduction to loading methods.

4.5 Concept of reflection and standing waves, definition of reflection coefficient, SWR & VSWR and their relation (no derivation).

4.6 Concept of transmission lines at high frequencies.

LIST OFPRACTICALS

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

RECOMMENDED BOOKS

1) Network Lines and Fields by John D Ryder; Prentice Hall of India, New Delhi
2) Network Filters and Transmission Lines by A K Chakarvorty; Dhanpat Rai &Co. Publication, New Delhi
3) Network Analysis by Van Valkenbury: Prentice Hall of India, New Delhi
4) Network Analysis by Soni and Gupta; Dhanpat Rai & Co. Publication, New Delhi
5) Network Theory and Filter Design by Vasudev K. Aatre
6) Network Filters and Transmission line by Umesh Sinha
7) Electrical & Electronics Measuring instrumentation, A. K Sawhney, Dhanpat Rai &Co. Publication, New Delhi
8) Network Filters and Transmission line by Nardeep Goyal, Rajneesh Kumari, Tech.Max Publication, Pune.

SUGGESTED DISTRIBUTION OF MARKS			
Sr. No	**Topic**	**Time Allotted (hrs)**	**Marks Allocation%**
1	Networks	18	30
2	Attenuators	06	15
3	Filters	18	30
4	Transmission Lines	14	25
Total		**56**	**100**

3.3 DIGITAL ELECTRONICS

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RATIONALE

To familiarize students with Boolean algebra, concepts of logic circuits, realization of various logic circuits using different logic gates. After this course the student will be able to design simple logic circuits, understand flip-flops, counters, registers and A/D & D/A converter circuits and their applications in electronic based control and switching circuits.

DETAIL CONTENTS

1. Introduction **4 hrs**

Analog Signal, Digital Signal, Difference between Analog & Digital Signal, Applications & Advantages of Digital Signal

2. Number System **8 hrs**

- Binary, Octal, & Hexadecimal number systems, Conversion from Decimal, Octal & Hexadecimal Systems to Binary System & Vice Versa.

- Binary Addition, Subtraction, Multiplication, Division, 1's and 2's compliment methods of subtraction.

- Concept of code: 8421, BCD, Excess 3 and Gray Code

- Concept of Parity

3. Logic Gates & Families **10 hrs**

- Logic symbol, logical expression and truth table of AND, OR, NOT, NAND, NOR, EX- OR and EX-NOR gates,
-Universal property of NAND and NOR gate.
- Logic Simplification Circuits-Basic laws of Boolean algebra, Duality theorem, De Morgan's Theorems.
- Boolean expressions using Sum of Products(SOP) and Product of Sums (POS) forms.
- K-map representation of logical functions.
- Minimization of logical expressions using K-map(2, 3, 4 variables).
-Logic Gates & Families (SSI, MSI, LSI, VLSI, ULSI)

4. Arithmetic Circuits **6 hrs**

-Half Adder/Full Adder Circuit, their design and implementation
- Half Subtracter /Full Subtracter Circuit, their design and implementation

5. Decoder, Encoder, Multiplexer & De-Multiplexer **8 hrs**

- Basic binary decoder, Encoder-Decimal to BCD Encoder

- Block diagram, Truth table, Logical expression and logic diagram of Multiplexers (4:1 and 8:1).
- Block diagram and Truth table of Demultiplexer (1:4 and 1:8)

6. Flip Flops, Counters, Shift-Registers **14 hrs**

-One-bit memory cell, clock signal, Latch-SR Latch, Difference between Latch & Flip-Flop

-**Flip Flops**: S-R Flip flop, D- Flip Flop, J-K Flip Flop, Master Slave Flip-Flop, T- Flip Flop

-**Counters**: Asynchronous Counters/Ripple Counter (2 bit, 3-bit, decade)

: Synchronous Counters (2bit,3-bit, decade synchronous counter), Ring Counter

Shift Registers: Concept of Shift registers, types of Shift registers (SISO, SIPO, PISO, PIPO and Universal Shift Registers)

- Applications of Flip-Flops, Counters & Shift Registers

7. Memories **02 hrs**

Classification of memories RAM, ROM, PROM, EPROM, E2PROM, Cache Memory, Static and dynamic RAM

8. D/A & A/D Converters **04 hrs**

- Digital to Analog Converters (Weighted register, R-2R Ladder D/A Converter)
-Analog to Digital Converter (Dual slope,Successive Approximation A/D Converter)
- Applications of A/D & D/A Converter

2. List of Practical:

1) Verification of truth table of various logic gates (NOT, OR, AND, NAND, NOR, EXOR).
2) To verify universal property of NAND and NOR gates.
3) Verification of De Morgan's theorem.
4) To design and implement Half adder Circuit.
5) To design and implement Full adder Circuit.
6) Implementation of Multiplexer/De multiplexer using Logic gates.
7) Construction of 7-segment decoder driver circuit.
8) Verification of State Table for RS, JK, D & T Flip-Flops.
9) Design and verify 2 or 3-bit Synchronous counter.
10) Design and verify 2 or 3-bit Asynchronous counter.

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 V K Sangar , Raj Publishers, Jalandhar
4. Digital Electronics by Tokheim, Tata McGraw Hill Education Pvt Ltd,
5. Digital Fundamentals by Thomas Floyds, Universal Book Stall
6. Digital Electronics by RP Jain, Tata McGraw Hill Education Pvt Ltd, New Delhi
7. Digital Electronics by KS Jamwal, Dhanpat Rai and Co., New Delhi
8. Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi

SUGGESTED DISTRIBUTION OF MARKS		
Chapter No	Time Allotted	Marks Allotted %age
1	4	5
2	8	15
3	10	15
4	6	10
5	8	15
6	14	25
7	2	5
8	4	10
Total	**56**	**100**

3.4 PRINCIPLES OF COMMUNICATION ENGINEERING

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4 - 2

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 as calendar late to them while studying practical communication systems.

DETAILEDCONTENTS

1. **Introduction** (02hrs)
1.1 Need for modulation and demo dilation in communication systems.
1.2 Basic scheme of a modern communication system.

2. **Amplitude modulation** (04hrs)
2.1 Derivation of expression for an amplitude modulated wave. Carrier and side band components. Modulation index. Spectrum and band width of AM Wave. Relative power distribution in carrier and side bands.
2.2 Elementary idea of DSB-SC, SSB-SC, ISB and VSB modulations, their comparison, and areas of application.

3. **Frequency modulation** (04hrs)
3.1 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.
3.2 Effect of noise an FM carrier. Noise triangle, Role of limiter, Need for pre-emphasis and de-emphasis, capture effect.
3.3Comparison of FM and AM in communication systems.

4. **Phase modulation** (02hrs)
Derivation of expression for phase modulated wave, modulation index, comparison with frequency modulation.

5. **Principles of Modulators** (8hrs)
Working principles and typical application of:-
-Square Law Modulation.
-Collector modulator
-Balanced Modulator

6. **Principles of FM Modulators** (06hrs)
Working principles and applications of reactance modulator, varactor diode modulator, VCO and Armstrong phase modulator

7. **Demodulation of AM Waves** (08hrs)

7.1 Principles of demodulation of AM wave using diode detect or circuit; concept of clipping and formula for RC time constant for minimum distortion (no derivation)

7.2 Principle of demodulation of AM Wave using synchronous detection.

8. **Demodulation of FM Waves** (08hrs)

8.1 Basic principles of FM detection using slope detector

8.2 Principle of working of the following FM demodulators:-

-Foster-Seeley discriminator

-Ratio detector

-Phase locked Loop (PLL)FM demodulators

9. **Pulse Modulation** (14hrs)

9.1 Statement of sampling theorem and elementary idea of sampling frequency for pulse modulation.

9.2 Basic concepts of time division multiplexing (TDM) and frequency division multiplexing(FDM).

9.3 Basic ideas about PAM, PPM, PWM.

9.4 Pulse code Modulation (PCM) Basic scheme of PCM system.

9.5 Pulse code Modulation (PCM) Basic scheme of PCM system. Quantization, quantization error, commanding, block diagram of TDMPCM communication system and function of each block. Advantages of PCM systems. Concepts of differential PCM (DPCM).

9.6 Delta Modulation (DM), Basic principle of delta modulation system, advantages of delta modulation system over PCM system. Limitations of delta modulation, concept of adaptive delta modulation(ADM).

LIST OF PRACTICALS

1. To observe an AM wave on CRO and measure its modulation index.
2. To obtain an AM wave from a square law modulator circuit and observe wave forms.
3. To obtain an FM wave from voltage controlled oscillator 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.
5. To obtain modulating signal from a FM Ratio detector circuit.
6. To observe the sampled signal and compare it with the analog input signal.
7. To observe and note the pulse modulated signals (PAM, PPM, PWM) and compare them with the corresponding analog input signal.
8. To feed an analog signal to a PCM modulator and compare the demodulated signal with the analog input.
9. To study the process of delta modulation/demodulation.

RECOMMENDEDBOOKS

1. Electronics Communication by Kennedy, Tata McGraw Hill, New Delhi
2. Electronics Communication by K S Jamwal , Dhanpat Rai and Co, New Delhi
3. Radio Engineering by G K Mittal, Khanna Publishers, New Delhi
4. Principles of Communication Engineering by D R 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 and Co., New Delhi.
6. Principles of Communication Engineering by Roody, Coolin

SUGGESTIVE DISTRIBUTION OF MARKS

Sr No	Topic	Time Allotted (hrs)	Marks Allocation%
1	Introduction	2	5
2	Amplitude modulation	4	10
3	Frequency modulation	4	10
4	Phase modulation	2	5
5	Principles of Modulators	8	10
6	Principles of FM Modulators	6	10
7	Demodulation of AM Waves	8	10
8	Demodulation of FM Waves	8	10
9	Pulse Modulation	14	30
Total		**56**	**100**

3.5 ELECTRONIC INSTRUMENTS AND MEASUREMENT

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RATIONALE

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

DETAILED CONTENTS

1. Basics of Measurements (04 hrs)

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

2. Transducers (14 hrs)

- Distinction between active and passive transducers with examples. Basic requirements of a transducer
- Principle of operation of the following transducers and their applications in measuring the physical quantities listed against each one of them:

Variable Resistance Type (strain gauge, thermistor, hygrometer)
i. Variable capacitance type (pressure gauge, dielectric gauge)
ii. Variable inductance type (LVDT, Burdon pressure gauge)
iii. Others (solid state sensor, thermocouple, piezoelectric device, photoelectric device, proximity probe)

3. Cathode Ray Oscilloscope (12 hrs)

- Construction and working of Cathode Ray Tube(CRT)
- 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
- Digital storage oscilloscope (DSO) : block diagram and working principle

4 Voltage, Current and Resistance Measurement (08 hrs)

- Principles of measurement of DC voltage, DC current, AC voltage, AC current,
- Principles of operation and construction of permanent magnet moving coil (PMMC) instruments and Moving iron type instruments,

5 Signal Generators and Analytical Instruments (08 hrs)

- Explanation of block diagram specifications of low frequency and RF generators, pulse generator, function generator
- Distortion factor meter
- Instrumentation amplifier: its characteristics, need and working

6. Digital Instruments (10 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 multi-meter
- Specifications of digital multi-meter and their applications
- Limitations of digital multi-meters.

LIST OF PRACTICALS

1. To observe the loading effect of a multi-meter while measuring voltage across a low resistance and high resistance
2. To observe the limitations of a multi-meter for measuring high frequency voltage
3. Measurement and plot of characteristics of optical devices like photodiodes, photocells.
4. Characteristics of light operated switch using photo-transistor and LDR
5. Measurement of strain using strain gauge.
6. Measurement of temperature using thermistor and thermocouple.
7. Measurement of linear and angular displacement
8. Measurement of distortion of RF signal generator using distortion factor meter

RECOMMENDED BOOKS

1. Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai 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, Satya Prakashan, New Delhi

SUGGESTED DISTRIBUTION OF MARKS		
Subjects	**Time Allotted (Hrs)**	**Marks Allocation (%)**
Basics of Measurements	04	5
Transducers	14	30
Cathode Ray Oscilloscope	12	25
Voltage, Current and Resistance Measurement	08	10
Signal Generators and Analytical Instruments	08	10
Digital Instruments	10	20
Total	**56**	**100**

3.6 ELECTRONICS DESIGN AND SIMULATION TECHNIQUES- I

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RATIONALE

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

LEARNING OUTCOMES

After completion of the course, the learner will be able to:

- Demonstrate skills in assembly of components, soldering, and desoldering techniques
- Prepare a PCB, mount the components and assemble in a cabinet
- Design of electric circuit using software ORCAD/ PSpice /EAGLE/ SEQUEL
- Demonstrate drilling, photo plating, explain concept of SMDs (Surface Mount Devices)
- Assemble circuits on PCB
- Design a mini project using basic techniques

PRACTICAL EXERCISES

1. Electronic Design

   - Selection and use of commonly used active and passive components
   - Testing of active and passive components
   - Develop skills in assembly of components, soldering, and soldering techniques
   - Procedure for Cabinet Making

2. Fabrication Techniques

   - Printed Circuit Boards (PCBs):
     - PCB board materials, their characteristics and plating, corrosion and its prevention.
     - Photo processing, screen printing, etching, high speed drilling, buffing, surface treatment and protection from harsh environments, plated through holes, double sided and multilayer PCBs.
     - Standards of board sizes. Modular assemblies edge connectors, multi board racks, flexible boards.
     - Assembly of circuits on PCB, soldering techniques, role of tinning, flow and wave soldering, solder ability, composition of solder. Edge connector. Elements of wire shaping.

3. P Spice/ ORCAD/EDA Based Circuit Simulations

- Introduction to WinSpice
- DC analysis of resistor network
- Characteristics of p-n junction diode
- Half wave rectifier
- Clamper circuit
- I/O characteristics of BJT
- Transistor CE amplifier
- Input and output characteristics of JFET

SUGGESTIVE LIST OF PROJECTS (to be designed individually)

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

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

2. RECOMMENDED BOOKS

2. Printed Circuit Board by Bosshart; McGraw Hill Education Pvt Ltd., New Delhi

3. Printed Circuit Board by RS Khandpur, Tata McGraw Hill Education Pvt Ltd., New Delhi

4. Electronics Techniques by Rajesh Kumar, NITTTR, Chandigarh

5. Modular CAD for PCBs using EAGLE Software by Rajesh Kumar, NITTTR, Chandigarh

6. Electronic Manufacturing Technology by KS Jamwal; Dhanpat Rai and Sons, New Delhi

4.1 ELECTRONIC DEVICES & CIRCUITS-II

L	T	P
4	-	2

RATIONALE

Having attained basic knowledge of diodes, transistors and amplifier circuits, this course will enable the students to learn about the use of transistors as an oscillator, electronic switch and its application on wave shapping circuits etc. It also gives information about FET, MOSFETs, OPAMP and their applications in the field of electronic service industry.

1 Sinusoidal Oscillators (10 hrs)

Working Principle of Oscillator, Use of positive feedback in amplifier circuit, Barkhausen criterion for oscillations, Difference between Oscillator & Electrical Generator.

Different Types of Oscillator circuits: Tuned collector, Hartley, Colpitts, Phase shift, Wien Bridge, and Crystal oscillator-Their working principle, frequency range and applications

2 Tuned Voltage Amplifier (6 hrs)

Series and Parallel resonant Circuits, Comparison between Series and Parallel resonant Circuits, Single & Double Tuned Voltage Amplifier Circuits and their frequency response

3 Wave Shaping Circuits (08 hrs)

- RC and RL integrating and differentiating circuits with their applications
- Diode clipping circuits, diode biased clipping circuits and clamping circuits and numerical problems on these circuits

4. Multi vibrator Circuits (8 hrs)

- Working principle of transistor as switch
- Concept of multi-vibrator: a stable, mono stable, and bi stable and their applications
- Block diagram of IC555 and its working and applications
- Working of IC555 as a stable and mono stable multi vibrator

5. Operational Amplifiers (10 hrs)

- Characteristics of an ideal operational amplifier and its block diagram and Pin Diagram of IC741
- Definitions: differential voltage gain, CMRR, PSRR, slew rate, input offset current, input offset voltage, total output offset voltage.
- Open loop configurations: Differential, Inverting & Non Inverting modes, limitations of open loop configuration.
- Closed loop configuration: As an inverting & non-inverting amplifier, Schmitt trigger circuit, comparator, adder, subtractor, differentiator and integrator.

6. Optoelectronic Devices (6 hrs)

Working principle of Photo-resistor, photo diode, photo transistor and their applications, Need for opto-isolation in electronic circuit, Working of opto-coupler circuit.

7. Regulated power Supplies (8 hrs)

- Working of DC regulated power Supply
- Line and load side regulation
- Regulator ICs (78XX, 79XX)

-Switching Mode Power Supply (SMPS)-Working Principle, advantages & applications.

List of Practical

1. To measure the frequency of the generated signal in Harley or Colpitt oscillator circuit and observe the output using oscilloscope.
2. To measure the frequency of the generated signal in Crystal oscillator circuit and observe the output using oscilloscope
3. To observe the response of RC Differentiator Circuit with square wave at the input. Observe the wave at output.
4. To observe the response of RC Integrator Circuit with square wave at the input. Observe the wave at output.
5. Observe the output at Clipper Circuit using diode clipper circuit with AC Signal at the input of clipper circuit. Observe the input /output waveform using Oscilloscope.
6. Observe the output at Clamper Circuit using diode clamper circuit with AC Signal at the input of circuit. Observe the input /output waveform using Oscilloscope at different biasing voltages in the clamper circuit.
7. Use of IC 555 as mono stable multivibrator and observe the output for different conditions
8. Use of IC 555 as a stable multivibrator and observe the output at different conditions
9. Design & build inverting and Non-inverting amplifier of desired voltage gain using OPAMP
10. Study and build a power supply using IC 7805/7905/7812

1. LIST OF RECOMMENDED BOOKS

- Basic Electronics and Linear Circuits by NN Bhargava, Tata McGraw Hills, New Delhi
- Electronic Principles by Sahdev, Dhanpat Rai and Sons, New Delhi.
- Electronics Principles by Malvino, Tata McGraw Hills, New Delhi
- Electronic Devices and Circuits by Millman and Halkias, McGraw Hills, New Delhi
- Electronics by Grob, Tata McGraw Hills, New Delhi
- Art of Electronics by Horowitz
- Electronic Circuit Theory by Boylste
- Operational Amplifiers and Linear Integrated Circuits by Ramakant A. Gaykwad
- Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS			
Sr. No	**Topic**	**Time Allotted**	**Marks Allocation%**
1	Sinusoidal Oscillators	10	15
2	Tuned Voltage Amplifier	6	15
3	Wave shapping Circuits	8	15
4	Mutivibrator Circuits	8	15
5	Operational Amplifiers	10	20
6	Optoelectronic Devices	6	10
7	Regulated Power Supplies	8	10
	Total	**56**	**100**

4.2 MICROPROCESSOR AND PROGRAMMING

L T P
4 - 2

RATIONALE

The course provides the student with the opportunity to study Architecture and memory management of 8bit &16bit microprocessor (i.e 8085& 8086),to study assembly language programming and to implement different system interfacing.

DETAILED CONTENTS

1. Evolution of Microprocessor (02hrs)

Typical organization of a microcomputer system and functions of its various blocks Microprocessor, its evolution, function and impact on modern society.

2. Architecture of a Microprocessor (With reference to 8085 microprocessor) (10 hrs)

Concept of Bus , bus organization no f8085, 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.

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

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, NXM bit RAM, Expansion of word length and capacity, static and dynamic RAM, basic idea of ROM, PROM, EPROM and EEPROM.

4. Programming (with respect to 8085 microprocessor) (14 hrs)

Brief idea of machine and assembly languages, Machines and Mnemonic codes. Instruction form at and Addressing mode. Identification of instructions as towhichaddressingmodetheybelong.ConceptofInstructionset.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).

5. Instruction Timing and Cycles (06hrs)

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

6. Interrupts (04 hrs)

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

7. Data transfer techniques (04 hrs)

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

8.16-bit Microprocessor 8086 (06 hrs)

Silent features of 8086 Microprocessor, architecture of 8086 (Block diagram, signal description), register organization, concepts of pipe lining, memory segmentation and memory address generation.

List of Practical.

1) Addition ofTwo8bitnumbers.
2) Subtraction ofTwo8bitnumbers
3) Multiplication of Two 8 bit numbers
4) Division of Two 8 bit numbers
5) Largest number in an array.
6) Smallest number in an Array.
7) Arrange data of an array in ascending order.
8) Arrange data of an array in descending order.
9) BCD Up counter
10) BCD Down Counter

Text Books:

1. An introduction to the Intel family of Microprocessors by James L. Antonakos Pearson Education Asia
2. Microprocessor Architecture programming & application with the 8085 Ramesh A. Gaonkar, Penfam International
3. Digital Electronics and Applications by Malvino Leach; Publishers McGraw Hills, New Delhi
4. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi. Microprocessor and Applications by B Ram

SUGGESTED DISTRIBUTION OF MARK		
Topic No.	**Time Allotted**	**Marks Allotted (%age)**
1	2	5
2	10	20
3	10	15
4	14	25
5	06	5
6	04	10
7	04	10
8	06	10
Total	**56**	**100**

4.3 POWER ELECTRONICS

L T P

4 - 2

RATIONALE

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

DETAILED CONTENTS

1. **Introduction to thyristors and other Power Electronics Devices** (**14 hrs**)

   1.1 Construction, Working principles of SCR, two transistor analogy of SCR, V-I characteristics of SCR.
   1.2 SCR specifications & ratings.
   1.3 Different methods of SCR triggering.
   1.4 Different commutation circuits for SCR.
   1.5 Series &parallel operation of SCR.
   1.6 Construction & working principle of DIAC, TRIAC & their V-I Characteristics.
   1.7 Construction, working principle of UJT, V-I characteristics of UJT. UJT as relaxation oscillator.
   1.8 Brief introduction to Gate Turnoff thyristor (GTO), Programmable uni-junction transistor (PUT).

2. **Controlled Rectifiers** **(10 hrs)**

   2.1 Single phase half wave controlled rectifier with R & R-L load.
   2.2 Single phase fully controlled full wave bridge rectifier R &R-L Load.
   2.3 Single phase fully controlled full wave center tap rectifier R&R-L Load.
   2.4 Single phase half controlled full wave rectifier with R & R-L Load.

3. **Inverters, Choppers, Dual Converters and Cyclo converters.** **(16 hrs)**

   3.1 Principle of operation of basic inverter circuits, concepts of duty cycle, series &parallel inverters & their applications.
   3.2 Choppers: Introduction, types of choppers (Class A, Class B, Class C and Class D). Step up and step down choppers.
   3.3 Dual Converter sand cyclo converters: Introduction, types & basic working principle of dual converters and cyclo converters & their applications.

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

4.1 DC drive control

i) Half wave drives.

ii) Full wave drives

iii) Chopper drives (Speed control of DC motor using choppers)

5. **Application of Power Electronic Devices (8 hrs)**

5.1 UPS, on-line, offline &their specifications

5.2 Light intensity control

5.3 speed control of universal motors

5.4 fan regulator

5.5 Automatic battery charger circuit

LIST OF PRACTICALS

1) To plot VI characteristic of an SCR.
2) To plot VI characteristics of DIAC.
3) To plot VI characteristics of TRIAC.
4) To plot VI characteristics of UJT and its use as relaxation oscillator.
5) Observation of wave shape of voltage at relevant point of single-phase half wave controlled rectifier and effect of change of firing angle.
6) Observation of wave shapes of voltage at relevant point of single phase full wave controlled rectifier and effect of change of firing angle.
7) Observation of wave shapes and measurement of voltage at relevant points in TRIAC based AC phase control circuit for varying lamp intensity.
8) Speed control of motor using SCR

Recommended Books:

1) Power Electronics by P. C. Sen Tata McGraw Hill. New Delhi
2) Power Electronics by P. S. Bhimbhra, Khanna Publishers, New Delhi
3) Power Electronics by M.S.Berde, Khanna Publishers, NewDelhi.
4) Power Electronics by MH Rashid
5) Industrial Electronics and Control by SK Bhattacharya and S.Chatterji, New Age Publications, NewDelhi
6) Power Electronics by S Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi
7) Power Electronics by Sugandhi and Sugandhi
8) Power Electronics–Principles and Applications by J Michael Jacob, Vikas Publishing House, New Delhi

SUGGESTIVE DISTRIBUTION OF MARKS			
Sr No	**Topic**	**Time Allotted (Hrs)**	**Marks Allotted%**
1	Introduction to thyristors and other power electronics devices	18	30
2	Controlled Rectifiers	10	20
3	Inverters, Choppers, Dual Converters and Cyclo converters.	16	25
4	Thyristorised Control of Electric drives	08	15
5	Uninterrupted Power supplies	04	10
Total		**56**	**100**

4.4 COMMUNICATION SYSTEMS

L T P
4 - 2

RATIONALE

This course provides the basics of electronic communication systems including transmitters, receivers, antennas and various modes of propagation of signals. In addition to components and systems of fiber optic communication, the students will learn the basics of satellite communication. This course will provide the students with perspectives of different communication systems.

DETAILED CONTENTS

1. **AM/FM Transmitters** (08hrs)
   a) Classification of transmitters on the basis of modulation, service, frequency and power
   b) Block diagram of AM transmitters and working of each stage
   c) Block diagram of FM transmitters and working of each stage

2. **AM/FM Radio Receivers** (14hrs)
   a) Principle and working with block diagram of super heterodyne of AM receiver. Function of each block and typical wave forms 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.
   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 wave forms at input and output of different blocks. Need for limiting and de-emphasising FM reception
   e) Block diagram of communication receivers, differences with respect to broadcast receivers.

3. **Antennas:** (14hrs)
   a) Electromagnetic spectrum and its various ranges: VLF, LF, MF, HF, VHF, UHF, Microwave.
   b) Physical concept of radiation of electromagnetic energy from a dipole. Concept of polarization of EM Waves.
   c) Definition and physical concepts of the terms used with antennas like point source, gain directivity, aperture, effective area, radiation pattern, beam width and radiation resistance, loss resistance.
   d) Types of antennas-brief description, characteristics and typical applications of half wave dipole, folded dipole, loop antenna, yagi and ferrite rod antenna
   e) Brief description of broad-side and end fire arrays, the irradiation pattern and applications (without analysis)

4. **Propagation:** (14hrs)

a) Basic idea about different modes of wave propagation and typical areas of application. Ground wave propagation and its characteristics, summer field equation for field strength.

b) Space wave communication – line of sight propagation, standard atmosphere, concept of effective earth radius range of space wave propagation standard atmosphere

c) Duct propagation: sky wave propagation-ionosphere and its layers. Explanation of terms-virtual height, critical frequency, skips distance, maximum usable frequency, and multiple hop propagation.

5. **Satellite Communications:** (06hrs)

-Basic idea, passive and active satellites, Meaning of the terms; orbit, apogee, perigee

-Geo-stationary satellite and its need. Block diagram and explanation of a satellite communication link.

LIST OF PRACTICAL

1. To plot the sensitivity characteristics of a radio receiver and determination of the frequency for maximum sensitivity.
2. To plot the selectivity characteristics of a radio receiver.
3. To plot the fidelity characteristics of a radio receiver.
4. To plot the radiation pattern of a directional and omni directional antenna.
5. To plot the variation of field strength of a radiated wave, with distance from a transmitting antenna.
6. To identify and study various types of antennas.

RECOMMENDED BOOKS

1. Communication systems By George Kennedy Tata McGraw Hill, New Delhi.
2. Communication systems By A.K. Gautam, SK Katria and Sons, New Delhi.
3. Electronic communication sytesms By K.S. Jammal, Dhanpat Rai and Sons, New Delhi.
4. Electronic communication system by Roddy and Coolen Prentice Hall of India, New Delhi.
5. Handbook of Experiments in Electronics and Communication Engineering by S. Poornachandra Rao, and B Sasikala, Vikas Publishing House Pvt Ltd, Jangpura, New Delhi.

SUGGESTIVE DISTRIBUTION OF MARKS			
Sr No	**Topic**	**Time Allotted (Hrs)**	**Marks Allotted%**
1	AM/FM Transmitters	08	15
2	AM/FM Radio Receivers	14	25
3	Antennas	14	25
4	Propagation	14	25
5	Satellite Communications	06	10
Total		**56**	**100**

4.5 AUDIO VIDEO SYSTEMS

L	T	P
4	-	2

RATIONALE

The objective of teaching this subject is to give students an in depth knowledge of various electronic audio and video devices and systems. Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices. Which in-turn will develop in them capabilities of assembling, fault diagnosis and rectification in a systematic way.

LEARNING OUTCOMES

After completion of the course, the learner should be able to:

- Explain the working of loudspeakers and microphones.
- Describe the basics of digital audio signals.
- Describe the working of colour television system (PAL).
- Use the basic principles of digital video and its compression techniques.
- Illustrate basic techniques of digital television transmission and reception.
- Compare the working of LCD, LED, HDTV and plasma screen television.
- Test color TV using pattern generator

DETAILED CONTENTS

1. Audio Systems (06 hrs)

   1.1. Microphones and Loudspeakers
   - a) Carbon, moving coil, cordless microphone
   - b) Direct radiating and horn loudspeaker
   - c) Multi-speaker system

2. Digital Audio Fundamentals (06 hrs)

   Audio as Data and Signal, Digital Audio Processes Outlined, Time Compression and Expansion.

3. Television (12 hrs)

   3.1. Basics of Television
   - Elements of TV communication system
   - Scanning and its need
   - Need of synchronizing and blanking pulses
   - Composite Video Signal

   3.2 Colour Television
   - Primary, secondary colours
   - Concept of Mixing, Colour Triangle
   - PAL TV Receiver
   - NTSC, PAL, SECAM (brief comparison)

4. Digital Video, Compression Techniques and Standards (08 hrs)

Digital Video, The RGB and YUV Representation of Video Signals, The Need for Compression, how compression works, Compression formats for video - MPEG-x format, H.26x format

5. Digital Television-Transmission and Reception (10 hrs)

Digital satellite television, Direct-To-Home (DTH) satellite television, Digital TV receiver, Merits of digital TV receivers, Digital Terrestrial Television (DTT), Introduction to :Video on demand, CCTV, CATV with optical fiber.

6. Liquid Crystal and Plasma Screen Televisions (14 hrs)

LCD technology, LCD matrix types and operation, LCD screens for television, Plasma and conduction of charge, Plasma television screens, Signal processing in Plasma TV receivers, A Plasma colour receiver, LCD colour receivers, Single LCD receivers, 3-LCD colour receivers, Performance comparison of Plasma and LCD televisions, Introduction to LED TV, RGB dynamic LEDs, Edge-LEDs, Differences between LED-backlit and Backlit LCD displays, Comparison of Plasma TV and LED TV, Introduction to OLED TVs.

LIST OF PRACTICAL

1. To plot the directional response of a Microphone
2. To plot the directional response of a Loud Speaker
3. To study public address system and its components.
4. To test color TV using pattern generator.
5. Study and installation of Direct-To-Home(DTH)
6. To study of cable television system.
7. To study and demonstration of LED T.V.

RECOMMENDED BOOKS

1. Modern Television Practice by R. R. Gulati; New Age International Publishers.
2. Audio Video Systems by R. G. Gupta; McGraw Hill Education System.
3. Television and Video Engineering by A. M. Dhake McGraw Hill Education System
4. Essential Guide to Digital Video by John Watkinson; Snell Wilcox Inc Publication
5. Guide to Compression by John Watkinson; Snell Wilcox Inc Publication
6. Audio Video Systems Principles Practices and Troubleshooting by Bali & Bali; Khanna Publishing Company
7. Consumer Electronics by S. P. Bali; Pearson Education, New Delhi

SUGGESTED DISTRIBUTION OF MARKS		
Topic No.	**Time Allotted (Hrs)**	**Marks Allotted (%)**
1	06	10
2	06	10
3	12	25
4	08	12
5	10	15
6	14	28
Total	**56**	**100**

4.6 **ELECTRONICS DESIGN AND SIMULATION TECHNIQUES- II**

L	T	P
-	-	6

RATIONALE

The purpose of this subject is to give practice to the students in elementary design and simulation of electronic applications. This also gives exposure about the basic android application development.

1. Software Applications in Electronics Engineering

Computer application overview through various applications software related to Electronics Engineering branch (at least any two) viz: ORCAD,H spice, KEIL and MATLAB/ Sci-lab.

2. Event Driven Circuit Simulation

(Using any relevant software like Circuit Maker, SEQUEL, and Electronic Workbench etc.)

- Introduction to Software
- Simulation of logic gates.
- Simulation of combinational circuit.

3. Android Applications

- History of Android
- Android features
- Android runtime application framework.
- Setting up development environment.
- Basic Applications development using android

RECOMMENDED BOOKS

1. Electronics Techniques by Rajesh Kumar, NITTTR, Chandigarh

2. Modular CAD for PCBs using EAGLE Software by Rajesh Kumar, NITTTR, Chandigarh

3. Electronic Manufacturing Technology by KS Jamwal; Dhanpat Rai and Sons, New Delhi

4. Beginner‘s guide to android app development by Create space Independent Pub.
5. Android app development for Dummies by Donn Felker, 3rd edition Dummies, John Welly and Sons.