E L E C T R O N I C S (C 2) : (Paper-I) XI

(100 Marks)   4 Lectures/Week)(80 Lectures)

1. Sources of Electrical Power, Internal impedance of Source,
    Concept of voltage and current source, power, kirchhoff's
    current and voltage law, Superposition theorem, Thevenin's
    theorem, Norton's theorem, Maximum power transfer theorem.
    (Only with dc sources and simple resistive network with
    maximum two sources only)

    (Ref. : Bhargava Sec. 2.1 to 2.4, Grob Sec. 9.1,9.2,10.1 to
    10.6)

    Review of Electromagnetism and electrostatics
    (Ref. : Grob 13.1 to 13.4, 14.1 to 14.5, 15.1 to 15.7)

                                        (20 Lectures)
                                        (25% Marks)

2. AC Fundamentals

    Generation of AC, the sine wave, alternating current,
    voltage and current values for a sine wave. Amplitude
    frequency, period, wavelength, phase angle, the time factor
    in frequency and phase. Non-sinosoidal AC waveforms, 50 HZ
    ac power time (Phase, neutral and ground), concept of
    impedance and reactance.

    (Ref. : Grob Sec. 16.2 to 16.12, 16.14)

                                        (10 Lectures)
                                        (15% Marks)

3. Instruments

    Permanent Magnet Moving Coil Mechanism (PMMC), DC ammeters,
    DC voltmeters, Voltmeter sensitivity, series type, shunt
    type ohmmeter (Loading Effect), multirange ammeter and
    voltmeter

    (Ref. : Cooper 4.3 to 4.6, 4.8 and 4.9)

                                        (12 Lectures)
                                        (15% Marks)

4. Study of Components

    Resistors -   Fixed and movable (types, properties and
                  their uses)

    Capacitors - Concept of capacitance, different types of
    dielectrics, electrolyric and non electrolyric types and
    their properties, series and parallel combination of
    capacitors. Study of charging and discharging of capacitor
    (Assuming final expression) concept of time constant.

(2)

Relay : Construction and operation of electromagnetic relay, reed relay, specification of relays such as current voltage ratings, contact current ratings, number of contacts.

Switches : Study of different types of switches.

Batteries : Rechargeable cells, NiCd & Li cells, solar cells.

Accessories for circuit construction

Types of wires, Lug/Tag boards, PCB, Breadboard.

Knowledge of significant technical specifications of componenets expected.

(Ref. : Grob 6.1 to 6.8, 17.1, 17.5, 17.7, 17.8, 20.1 to 20.10, 17.6)

(38 Lectures)
(45% Marks)

References :

1.   Basic Electronics (First Metric Edition)
      Bernard Grob
      MaGraw - Hill Book Company

2.   Basic Electronics and Linear Circuits
      N.N.Bhargava D.C.Kulshreshtha, S.C.Gupta
      Tata Megraw- Hill Publishing Company Ltd., New Delhi.

3.   Electronic Instrumentation and Measuring Techniques (3rd Edition)
      W.D.Cooper, A.D. Helfrick
      Prentice Hall of India Pvt. Ltd., New Delhi.

(100 Marks)   _(4 lectures/week)(80 lectures)_

1.   _Semiconductor_

     Atomic structure, Energy levels, crystals, concept of hole,
     Energy bands of materials. Intrinsic Semiconductors,
     Extrinsic Semiconductors, concept of doping, N Type, P Type
     Semiconductor. Formation of p-n junction, barrier
     potential, depletion region, Forward and reverse biasing
     of diode characteristics of a p-n junction

     (Ref. : Bhargava 3.1 to 3.6, 4.1 to 4.3 OR MALVINO 2.1 to
     2.8)

                                             (10 lectures)
                                             (15% Marks)

2.   _Study of Transistor_

     Bipolar transistor - Structure and working, Relation
     between different currents in a transistor,   Sign
     conventions, transistor configuration - CE, CB and CC and
     their comparison, Characteristics of CE amphlifier, DC load
     line, Transistor as switch.

     JFET - Structure and operation of FET, Characteristics and
          parameters

     MOSFET-Depletion and enhancement type MOSFET
     UJT-   Structure and characteristics of UJT

     (Ref. : Bhargava - 5.1 to 5.4, 5.6, 5.8, 5.7-2 to 5.10-1,
     5.14-1 to 5.14.-3. Malvino : 13.1, 13.4, 21.6, 12.1)

                                             (20 lectures)
                                             (25% Marks)

3.   _Study of Semiconductor Components_

     Types of diodes- power, signal, Zener, Varactor, Schottky,
     photodiode, LED. (Symbols, features and applications) Types
     of transistors - power, switching and photo transistors.
     Study of SCR, TRIAC and DIAC

     (Ref. : Bhargava - 4.9, Malvino : 4.1 to 4.6, 5.8,
     21.3,21.5

                                             (15 lectures)
                                             (20% Marks)

4.   _Amplifiers_

     Concept of amplification, transistor biasing,collector self
     bias and potential _divider bias_ its merits and demerits.
     Function of emitter resistor in bias stabilization. It's
     advantages and disadvantages. Study of single stage CE
     amplifier. Frequency response, band — width, Gain band
     width product. (concept of negative feedback in amplifiers)

     Types of couplings in multistage amplifiers (Merits and
     demerits)

Classification in amplifiers, study of differential amplifier.

(Ref. : Bhargava 7.2 to 7.5, 7.6-2 to 7.6-3, 7.6-4, 9.1 to 9.4, 9.7 Malvino : 6.3, 6.4, 6.5, 15.2)

(25 lectures)
(30% Marks)

5. Classification of Oscillators, Positive feedback amplifier as oscillator. Conditions for oscillation, LC Oscillators - Hartley and colpitts oscillators. RC oscillators phase shift, wien-bridge

(Ref. : Bhargava 13.1 to 13.4, 13.5-3, 13.6, 13.6-3)

(10 lectures)
(10% Marks)

References :

1. Basic Electronics and Linear circuits
   N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta
   Tata McGraw - Hill Publishing Company Ltd.

2. Electronic Principles (Third Edition)
   A.P.Malvino
   Tata McGrow - Hill Publishing Company Ltd.

<u>E L E C T R O N I C S (C2)</u> *XII (Paper-I)*

(100 Marks)   *4 Lectures/week)(80 lectures)*

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1.   <u>Instruments</u>

Detail*ed* study of CRT (Mathematical Part not expected). How a CRO displays waveform, block diagram of CRO, Front panel controls, Application ofCRO.

Function Generator - basic elements of function generator.

Digital Multimeter - block diagram

(Ref. : Bhargava 14.4 and Cooper)

                                                (12 lectures)
                                                (15% Marks)

2.   <u>Power Supply</u>

Half wave rectifier, full wave rectifier, Bridge Rectifier, filter circuit, load regulation, line regulation, zener as voltage regulator. Basic principle of voltage regulation using transistor circuit.

Three terminal regulator IC's

Basic Principle of SMPS and its advantages

(Ref. : Malvino 3.3 to 3.6, 19.1 to 19.4, 19.6)

                                                (12 lectures)
                                                (20% Marks)

3.   <u>Transducers</u>

Classification of transducers, Selection of transducers, types of transducers, working of following transducers - Thermistor, LDR, *load* capacitive transducer, LVDT, Piezo electric crystal, speaker, gas sensor, Opto coupler

(Ref. : Cooper)

                                                (10 lectures)
                                                (10% Marks)

4.   <u>Operational Amplifiers</u>

Necessity of Op Amp, block diagram of Op-Amp, Op-Amp parameters. Linear applications of Op-Amp : Inverting and Non-Inverting, Amplifier, Buffer amplifier, concept of virtual ground. Adder subtractor, Integrator and Differentiator circuits.

(Definition in each case expected)

Non-liner Applications - Comparator, Schmitt trigger

(Ref. : Gaikwad., Malvino - 15.5, 15.6, 17.1(Fig.17.1), 17.2(Fig.17.7), 17.4(fig. 17.17a only), 18.2(fig.18.5), 18.4 (fig.18.13a), 18.9, 18.6 (fig. 18.20a)

                                                (12 lectures)
                                                (25% Marks)

5. <u>Modern Electronic Communication</u> :

The elements of communication system, types of electronic communication, survey of communication applications, electronic spectrum, concept of bandwidth, AM principles, Modulation index and percentage of modulation, sidebands and frequency domain, Frequency modulation (Principle), phase modulation (principle)

Types of communication satellites, satellite communication system, application overview of satellite communication. Concept of digital communication.
Introduction to Modems
Introduction to computer networks
Use of fibre optics in communication
Review of some modern communication applications : concept of FACSIMILE, Cellular radio and Radar.

(Ref. : Frenzel : 1.2 to 1.6, 2-1 to 2.3, 4.1, 4.2, 11.1, 11.2, 11.5, 12.1, 12.2, 12.4, 13.1, 14.1 (P.No. 376 to 378 exclude CCD (319,320) (P.No. 382 to 383) 14.3 (P.No. 388 to 393)

(24 lectures)
(20% Marks)

6. <u>Study of Integrated Circuits</u> :

Block diagram, pin functions and simple applications of the following IC's - 555, 741 and LM 317 use of IC-555 as astable and monostable.

(Ref. : Data book and application notes)

(10 lectures)
(10% Marks)

E L E C T R O N I C S (C2) XII (Paper-II)

(100 Marks)   **(4 lectures/week)(80 lectures)**

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1. ### Number system and Boolean Algebra :

    Decimal, Binary and Hexadecimal number system, BCD code,
    Binary to decimal and decimal to binary conversion, Hex to
    Binary and Binary to Hex conversion, Hex to Decimal and
    Decimal to Hex conversion, ASCII code, Binary Arithmetic.

    (Ref. : Jain 2.2 to 2.3, 2.8, 2.5, 2.6, 2.9-7) or (M.B. 1.1
    to 1.13 except 1.6)

    (10 lectures)
    (15% Marks)

2. ### Basic Logic Gates

    Study of NOT, OR, AND gates, Symbols and truth tables,
    boolean algebra; NAND, NOR as universal building blocks, De
    Morga n's therems, EXOR gate, Half Adder, Full Adder.

    (Ref. : Jain : 1.3, 1.4, 1.5, 1.6 or M.B. : 2.1 to 2.4,
    3.1 to 3.5

    (10 lectures)
    (15% Marks)

3. ### Logic families and IC specification

    Introduction to logic families - bipolar logic families and
    unipolar logic families.
    Characteristics of Digital IC's, TTL NAND gate, CMOS, NAND,
    NOT, NOR gates.
    Open collector TTL NAND gate, tristate concept, tristate TTL
    NAND gate.

    (Ref. : Jain 4.1.1, 4.1.2, 4.2, 4.8, 4.12, 4.13 or Malvino
    Ch.6 and Ch.7)

    (12 Lectures)
    (10% Marks)

4. ### Multiplexers - De Multiplexers, Encoder-Decoder

    Multiplexers and their use in combinational logic
    design, Combinational logic design using multiplexers.
    DeMultiplexer and its use in combinational logic design

    Encoder - Priority encoders
    Decoder - decoder, and drivers for display devices.

    (Ref. : Jain 6.2.1 to 6.2.2, 6.3.1, 6.10 and 6.11)

    (12 lectures)
    (20% Marks)

5. ### Flip Flops, Counters and Registers

    S-R Flip Flop, clock, clocked S-R flip flop, D flip flop, T

Registers, Shift register

(Ref. : Jain 7.3 to 7.6, 7.9, 8.2, 8.3, 8.4, 8.5)

(14 lectures)
(20% Marks)

6.   A/D and D/A convertors

Introduction, Digital to Analog convertor - weighted resistor ladder, R-2R ladder.

Analog to digital convertor - counter type ADC, Successive approzimation A/D convertor

(Ref. Malvino Leach : 13.1, 13.2, 13.6 and 13.8)

(12 lectures)
(12% Marks)

7,   Computer :

Block diagram of computer, concept of bus, study of Input Output devices like keyboard, mouse, light pen, digitizer, printer and its types, plotters.

Study of memory devices like hard disk, floppy drives, semiconductor memory, magnetic tape

Specifications of computer

(Ref. : Computer and Commonsence - Hunt and Shelly)

(10 lectures)
(8% Marks)

References :

1.   Modern Digital Electronics - R.P.Jain
       Tata McGrow Hill Publishing Co. Ltd.,

2.   Digital Computer Electronics - A.P. Malvino and J.A.Brown
       (Third Edition) Tata McGraw hill Publishing Co. Ltd.)

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ELECTRONICS (XI)(PAPER-I)
(Practical-I)

(4 periods week)

TOPICS

1. Study of Thevenin's thm. (to prove the theorem with equivalent circuits. Network with 4-5 resistors and one source)

2. To prove maximum power transfer theorem

3. Study of sinusoidal and non-sinusoidal waveform on CRO. (Demonstration of period, frequency, amplitude and phase for sine, triangular, square waveforms)

4. Use of PMMC movement to construct voltmeter and multirange voltmeter.

5. Use of PMMC movement to construct ammeter and multirange ammeter.

6. Study of multimeter (analog and digital) to measure voltage, current and resistance.

7. Study of loading effect using analogue meter, study of errors.

8. Study of various resistors. Study of potential divider arrangement using fixed and variable resistors.
Balancing of simple wheatstone's bridge using two variable resisters in opposite arms (potentiometers)

9. Identification of capacitors. To study charging and discharging of capacitor and plot V-I curve.

10. Study of relay. Measure pull-in and drop-out voltage and current for relay. Study of reed relay.

11. Study of various types of switches

12. To prepare a simple inductor using bobbin and copper wire, then study the effect of different cores.

13. Construction of a simple bridge rectifier using filter capacitor by soldering the components on tag/lug board.

14. Construction of a simple multivibrator circuit using IC 555 on PCB.

15. Construct a CE amplifier on breadboard.

16. To determine turns ratio of a given transformer. Study its regulation factor and power-rating

NOTE Student must perform 15 practicals in each paper.

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ELECTRONICS (XI)(PAPER-II)
(Practical-II)

(4 periods week)

TOPICS :

1. Study of P type / n type semiconductor for resistive characteristics. Effect of Temperature. (using BFW10/2N 2666)

2. Forward and revarse characteristics of P-n junction Ge, Si & LED) (all three)

3. Testing of different types of diode and transistors using multimeters.

4. Study of input and output characteristics of CE configaration.(Determine).

5. Study of FET characteristics

6. Study of UJT characteristics

7. Transistor as a switch, use of transistor to drive LED, buzzer and relay

8. Study of photodiode and phototransistor (Demo expt)

9. Study of amplification using simple amplifier

10. Study frequency response of given audio frequency amplifier.

11. To measure input and output resistance of a CE amplifier.

12. Study of half wave rectifier and full wave rectifier - load regulation (full wave using two diodes & centre tap transformer)

13. Study of full wave bridge rectifier - regulation

14. Study of given sinusoidal oscillator and measure its oscillating frequency.

15. Study of simple burglar alarm using SCR, piezo buzzer and LDR.

16. Demonstration experiment on negative and positive feedback concept.

17. Study of role of equalizer circuit in an amplifier (demo)

NOTE Student must perform atleast 15 practicals from above experiments.

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<u>ELECTRONICS (XII)(PAPER-I)</u>
(Practical-I)

(4 periods-week)

TOPICS :

1. Study of front pannel controls of CRO.
    Use of CRO for frequency and phase measurement.

2. Study of Zener diode as voltage regulator - load regulation.

3. Study of variable dc supply using IC 317 - load regulation and line regulation.

4. Study of temperature characteristics of thermistor. To measure melting point of wax using thermistor.

5. Study of photorelay using LDR.

6. Study of opto coupler, and its use in determination of RPM.

7. Inverting amplifier using OP AMP

8. Non-inverting amplifier. using OP AMP

9. Adder using OP AMP

10. Subtractor cicuit using OP AMP

11. Use of Op-Amp as buffer and study its application using potential divider arrangement.

12. Use of Op-Amp as comparator (use of input protection diode)

13. Use of Op-Amp as Schmitt trigger

14. Study of the waveforms in simple AM circuit.

15. Study of FSK

16. Study of IC555 in monostable mode

17. Study of IC555 as astable multivibrator

NOTE Students must perform 15 experiments out of the above list.

ELECTRONICS (XII)(PAPER-II)
(Practical-II)

4 periods - week)

TOPICS :

1. Study of logic gates and verification of DeMorgan's theorems.

2. Implementation of logic using gates for a given equation

3. Study of Ex-OR gate and its use as controlled invertor

4. Determination of noise margin from actual voltage measurement in TTL gales.

5. Construction ofRS flip flop using NAND gates

6. Study of Multiplexer IC 74153 (Dual 4 to 1 mux)

7. Study of DeMultiplexer using IC 74139 (Dual 4 to 1 max)

8. Study of encoder using IC 74147 (Decimal to BCD)

9. Study of decoder using IC 7447/7448

10. Study of decade counter using IC 7490

11. Construction ofhalf adder

12. Full adder using gales

13. Study of full adder using IC 7483

14. Square wave generator using Schmitt trigger invertor

15. D-A convertor using R-2R ladder and Op-Amp.

16. Study of diode matrix ROM

17. Identification of different parts of computer. Format a floppy disc. Prepare an index of all experiments and take a printout.

NOTE : Students must perform atleast 15 experiments out of above list.

BOOKS RECOMMENDED

1. *Basic Electronics and Linear Circuits.*
    By : Bhargava, Gupta, Kulshreshtha

2. *Basic Electronics*
    By : Grob

3. *Electronic Instrumentation and Measuring Techniques*
    By : Cooper and Helfrick

4. *Electronic Principles*
    By : A.P. Malvino

5. *Communication Electronics*
    By : Frenzel

6. *Modern Digital Electronics*
    By : R.P.Jain

7. *Digital Computer Electronics*
    By : A.P. Malvino

8. *Computer and Commansense*
    By : Hunt and Shelly

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