

6851

**TELEVISION ENGINEERING - I**

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**AIMS**

To provide the students with an opportunity to acquire knowledge, skill and attitude in the area of monochrome television engineering with special emphasis on:

- features of television communication
- composite video signal
- television camera tube
- television transmitter and receiver.
- black & white picture tube.
- receiver circuit
- test equipment
- television studio

**SHORT DESCRIPTION**

Television communication; Factors of television system; Composite video signal; Television camera tube; Television transmitter and receivers; Black and white picture tube; Circuit diagram of a black and white TV; TV antenna; Booster; Feeder cables; Test equipment and TV studio.

**DETAIL DESCRIPTION**

**Theory :**

**1 Understand the features of television communication.**

- 1.1 Describe the elementary idea of the role of TV camera, TV transmitter, propagation of signal, reception through antenna, TV receiver for TV communication.
- 1.2 Explain the TV communication with a basic block diagram.
- 1.3 Describe the CCTV, MATV and satellite TV communication with applications.
- 1.4 Describe the factors affecting range of TV coverage such as line of sight propagation, earth's curvature, antenna heights and power of transmitter.

**2 Understand the factors of television system.**

- 2.1 Describe the terms: gross structure, Image continuity, fine structure and tonal gradation.
- 2.2 Describe number of scanning lines and scanning methods.
- 2.3 Define the terms: field, frame, persistence of vision, flicker, picture element, aspect ratio, interlace error.
- 2.4 Mention the Specification of CCIR, FCC standard used in Television.
- 2.5 List the specification of CCIR standard used in Bangladesh for monochrome television.
- 2.6 Mention the frequency range, sound and picture carrier of various bands and channels in the VHF range used in Bangladesh.
- 2.7 Calculate the required channel bandwidth for transmission of television signal.

**3 Understand the features of composite video signal.**

- 3.1 List the different signals in the composite video signal.
- 3.2 Describe the video signal dimensions and dc component of the video signal with diagram.
- 3.3 Explain the need for sync, blanking and equalizing pulses.
- 3.4 Describe the need for VSB transmission in television broadcasting.
- 3.5 Describe the reason for employing AM for vision.
- 3.6 Describe the reason for employing FM for sound.
- 3.7 Mention the reason for using negative modulation for TV transmission.

**4 Understand the features of television camera tube.**

- 4.1 Describe the basis of photoelectric conversion from screen to electrical signal through camera tube.
- 4.2 Describe the construction of vidicon, silicon diode and saticon camera tubes.

- 4.3 Explain the principle of operation of vidicon, silicon diode, solid state Image scanner and saticon camera tubes.
- 4.4 Describe the construction and operation of Solid state Image Scanner.
- 4.5 Explain the term gamma and need for gamma correction.
- 4.6 Define the terms image lag, sensitivity and dark current of a camera tube.
- 5 Understand the features of black and white television transmitter.**
  - 5.1 Draw the block diagram of a standard black and white TV transmitter.
  - 5.2 Level the signals at input and output of each block.
  - 5.3 Describe the functions of each block.
  - 5.4 Describe the basic principle of operation of typical TV transmitter.
- 6 Understand the features of a TV receiver.**
  - 6.1 Draw the block diagram of a black and white (B&W) TV receiver (Transistor and IC models).
  - 6.2 Level the signals at input and output of each block.
  - 6.3 Describe the functions of each block.
  - 6.4 Describe the possible effect of malfunction of each block on the receiver performance.
  - 6.5 Identify the faulty block/blocks when simple fault symptoms are given.
- 7 Understand the features of B & W picture tube.**
  - 7.1 Describe the construction of a B & W picture tube.
  - 7.2 Explain the operating principle of a black & white picture tube.
  - 7.3 Describe the electromagnetic deflection system.
  - 7.4 Describe the transfer characteristics of a B & W picture tube.
  - 7.5 Describe the function of picture tube circuit controls.
  - 7.6 Differentiate between camera tube and picture tube.
- 8 Understand the circuit diagram of a B & W TV (IC/ Transistor/Hybrid Models).**
  - 8.1 Draw the tripical circuit diagram of each block of a B & W TV receiver.
  - 8.2 Explain the working principle of each block including typical DC voltages, signal level and wave forms expected at critical points.
  - 8.3 Explain the procedure of test and alignment of each block.
  - 8.4 Describe the response characteristics of RF, IF, detector and video stages.
  - 8.5 Describe typical faults caused by miss adjustment and common component failure in each stage.
- 9 Understand the features of TV antenna, Booster and Feeder cables.**
  - 9.1 Mention the different types of TV antenna and dimensions of elements.
  - 9.2 Mention the procedure of installation of TV antenna.
  - 9.3 List the use of 300 ohm wire cable and 75 ohm co-axial cable for TV signal distribution and attenuation.
  - 9.4 Different between 75 ohm and 300 ohm cables.
- 10 Understand the concept of test equipment and test charts.**
  - 10.1 Mention the alignment and servicing equipment of television.
  - 10.2 Describe the standard test charts and their interpretation & use.
  - 10.3 Describe the use of B & W test pattern generators for receiver test and alignment.
  - 10.4 Describe signal injectors and their uses for fault finding.
  - 10.5 Describe typical fault charts.
  - 10.6 Describe trouble shooting procedure of B & W TV.
  - 10.7 Mention the safety precautions in television servicing.
- 11 Understand the organization of television studio.**
  - 11.1 Mention the basic audio, video sources and controls in the studio.
  - 11.2 Draw the diagram of a typical broadcast studio system.
  - 11.3 Describe the function of each stages of a television studio.
  - 11.4 Describe tele scene, slide, background superimposition, taylor etc.
  - 11.5 Describe audio dubbing and video editing.

## **Practical :**

- 1 Identify with physical layout, location of stages and major components of a Black and White (B & W) TV receiver.**
  - 1.1 Select a B & W TV receiver with circuit diagram and required tools & materials.
  - 1.2 Observe the physical layout.
  - 1.3 Identify the location of stages and components number.
  - 1.4 Identify the location of major components in the physical circuit.
- 2 Locate all controls and effect of adjustments of controls on the performance of B & W TV receiver.**
  - 2.1 Select a B & W TV receiver with circuit diagram and required tools & materials.
  - 2.2 Observe the location of different control knobs.
  - 2.3 Switch on the power supply.
  - 2.4 Adjust each control knob.
  - 2.5 Observe the effect on the TV receiver.
  - 2.6 Adjust the controls for best performance.
- 3 Reassemble CRT and allied parts of a B & W TV receiver.**
  - 3.1 Select a B & W TV receiver with required materials tools and equipment.
  - 3.2 Observe the mechanism of mounting CRT.
  - 3.3 Dismount magnet, coil and earth straps.
  - 3.4 Re-assemble the parts again.
  - 3.5 Adjust the controls for best performance.
- 4 Test the B & W TV CRT and associated circuits for defective operation.**
  - 4.1 Select the B & W TV receiver with required tools and materials.
  - 4.2 Switch on the power supply.
  - 4.3 Observe the defects.
  - 4.4 Check the pin connections.
  - 4.5 Check the typical operating voltage.
  - 4.6 Check the resistance of coils.
  - 4.7 Observe the fault and make remedy.
- 5 Test the E H T and other high voltage section of a B & W TV receiver.**
  - 5.1 Select a B & W TV receiver with required materials and equipment.
  - 5.2 Switch on the power supply.
  - 5.3 Observe the presence of high voltage.
  - 5.4 Observe the associated circuits for high voltage.
  - 5.5 Identify the typical fault conditions.
- 6 Test the horizontal sweep circuit with typical fault conditions.**
  - 6.1 Select a B & W TV receiver with required tools and materials.
  - 6.2 Switch on the power supply.
  - 6.3 Observe the picture.
  - 6.4 Make some typical faults.
  - 6.5 Observe the performances of horizontal sweep circuit.
  - 6.6 Remove the fault and observe the operations.
- 7 Test the vertical sweep with typical fault conditions.**
  - 7.1 Select a B & W TV receiver with required tools and materials.
  - 7.2 Switch on the power supply.
  - 7.3 Observe the performance of vertical sweep circuit.
  - 7.4 Create some faults in vertical section and observe the effect.
  - 7.5 Remove the faults for normal operation.
- 8 Test the tuner stage with typical fault conditions.**
  - 8.1 Select a B & W TV receiver and required tools & materials.
  - 8.2 Switch on the power supply.
  - 8.3 Observe the operation.
  - 8.4 Change tuner adjustment.
  - 8.5 Observe the performance.
  - 8.6 Adjust the tuner for best operation.

- 9 Test the vision IF and detector stage with typical fault conditions.**
- 9.1 Select a B & W TV receiver with required tools and materials.
  - 9.2 Observe the connection of the circuit.
  - 9.3 Switch on the power supply.
  - 9.4 Observe the input and output wave shapes of the stages.
  - 9.5 Create some fault in the circuit.
  - 9.6 Observe the effects.
  - 9.7 Remove the faults and observe the result.
- 10 Test the synchronization (sync) separator stage with typical fault conditions.**
- 10.1 Select a black & white TV receiver with required tools and materials.
  - 10.2 Identify the sync. separator stage.
  - 10.3 Switch on the power supply.
  - 10.4 Observe input and output wave shapes.
  - 10.5 Create some faults in the stage and observe the effect.
  - 10.6 Remove the fault for normal operation.
- 11 Test the sound stage with typical fault conditions.**
- 11.1 Select on B & W TV receiver with required materials and tools.
  - 11.2 Identify the sound stage.
  - 11.3 Switch on the power supply.
  - 11.4 Observe sound and wave shapes at typical points.
  - 11.5 Create some faults in the circuit and observe the effect.
  - 11.6 Remove the fault and observe the operation.
- 12 Test the video output stage with typical fault conditions.**
- 12.1 Select a B & W TV receiver with required tools and materials.
  - 12.2 Identify the video output stage.
  - 12.3 Switch on the power supply.
  - 12.4 Observe the wave shapes at typical points.
  - 12.5 Create some faults and observe the effect.
  - 12.6 Remove the fault and observe the operation.
- 13 Test the power supply stage a with typical fault conditions.**
- 13.1 Select a B & W TV receiver with required tools and materials.
  - 13.2 Identify the power supply stage.
  - 13.3 Measure voltages at typical points.
  - 13.4 Create some faults.
  - 13.5 Observe the effect.
  - 13.6 Remove the fault and observe the operation.
- Visit a Television studio and prepare a report.

## REFERENCE BOOKS

1. Monochrome and Color Television  
– R R Gulati
2. Basic Television and Video Systems  
– Benrard Grob

**AIMS**

To provide the student with an opportunity to acquire knowledge, skill and attitude in the area of measurement and measuring instruments of electrical quantities with special emphasis on;

- Accuracy, precision, sensitivity and error in electrical measuring instruments.
- Concept of operation of different types of electrical measuring instruments.
- Selection of correct type of meters for particular measurement.
- Concept of Oscilloscope and wave analyzer

**SHORT DESCRIPTION**

Fundamentals of measurements; Indicating instruments; Digital instruments; Current & voltage measuring instruments; Oscilloscope and wave analyzer.

**DETAIL DESCRIPTION****Theory:****FUNDAMENTALS OF MEASUREMENTS****1. Understand the basic concept of measurements.**

- 1.1 Define measurements of electrical quantities.
- 1.2 Discuss significance of measurements.
- 1.3 Describe the terms accuracy, precision, sensitivity and resolution or discrimination.
- 1.4 Distinguish between accuracy and precision.
- 1.5 Describe errors in measurements.
- 1.6 State true value, static error or absolute error, relative error, static correction, limiting error and percentage limiting error.
- 1.7 Define the loading effect.
- 1.8 Describe the loading effects due to shunt connected instruments.
- 1.9 Describe the loading effects due to series connected instruments.
- 1.10 Solve problems related to errors in measurement.

**2. Understand the classification of measuring instrument.**

- 2.1 Describe measuring instrument.
- 2.2 Name two main types of measuring instruments.
- 2.3 Describe absolute and secondary instruments.
- 2.4 List two types of secondary instruments according to their mode of operation.
- 2.5 List three types of secondary instruments according to their functions.
- 2.6 Describe indicating, recording and integrating instruments.
- 2.7 Discuss the various effects of current or voltage utilized in measuring instrument upon which their operation depends.

**INDICATING INSTRUMENTS****3. Understand the principle of operation of indicating instruments.**

- 3.1 Name the three torque applied in indicating instrument which act upon their moving system.
- 3.2 Discuss deflecting torque and controlling torque.
- 3.3 Discuss spring control and gravity control system.
- 3.4 Compare between spring control and gravity control system.

- 3.5 Solve problems related to spring control and gravity control system.
  - 3.6 Explain damping torque.
  - 3.7 Name the three systems of damping.
  - 3.8 Compare air friction damping, fluid friction damping and eddy current damping.
- 4. 4 Understand the constructional features of measuring instruments.**
- 4.1 Name the essential parts of measuring instruments.
  - 4.2 Describe the parts of the instrument such as supporting, moving system, balancing, permanent magnets, pointer, scale, zero-adjuster, cases, etc.
  - 4.3 Discuss the torque weight ratio.

## **CURRENT & VOLTAGE MEASURING INSTRUMENTS**

- 5. Understand the concepts of ammeters and voltmeters.**
- 5.1 Explain the principle of operation of ammeter and voltmeter.
  - 5.2 Distinguish between the working principle of ammeter and voltmeter.
  - 5.3 List the various types of ammeter and voltmeter.
- 6. Understand the principle of operation of moving iron instruments.**
- 6.1 Describe the construction and working principle of moving iron attraction type instruments.
  - 6.2 Express the deduction of the torque equation of the moving iron attraction type instruments.
  - 6.3 Describe the construction and working principle of repulsion type moving iron instrument.
  - 6.4 Express the deduction of the torque equation.
  - 6.5 List the advantages and disadvantages of moving iron instruments.
  - 6.6 Discuss errors in moving iron instruments.
  - 6.7 Solve problems related to torque equation of moving iron instruments.
- 7. Understand the principle of operation of moving coil instruments.**
- 7.1 Describe the construction and working principle of permanent magnet moving coil instruments.
  - 7.2 Express the deduction of the torque equation of the moving coil instrument.
  - 7.3 Mention the advantages and disadvantages of permanent magnet moving coil instruments.
  - 7.4 Describe the construction and working principle of dynamometer type moving coil instruments.
  - 7.5 Indicate the arrangement of coils of dynamometer type instruments for measurements of current and voltage.
  - 7.6 Discuss the errors of moving coil instruments.
  - 7.7 Solve problems related to torque equation of moving coil instruments.

## **DIGITAL INSTRUMENTS**

- 8. Understand the concept of digital instrument.**
- 8.1 Explain the principle of operation of digital instruments.
  - 8.2 Describe the advantages of digital instruments.
  - 8.3 Compare digital instruments with the analog instruments.
- 9. 10 Understand the concept of digital display system.**
- 9.1 Mention the different types of digital display system.
  - 9.2 Describe seven segment display and 3×5 dot matrix display.
  - 9.3 Describe the construction of liquid crystal display.
  - 9.4 Describe the operation of gas discharge plasma display.

9.5 Explain resolution in digital meter and sensitivity of digital meters.

**10. Understand the concept of digital voltmeter.**

10.1 Describe the operation of transistor voltmeter (TVM).

10.2 Describe the operation of ramp type digital voltmeter (DVM).

**10.3** Describe the operation of successive approximation digital voltmeter.

**11. Understand the multimeter.**

11.1 Describe the uses of multimeter.

11.2 Explain the circuit of analog multimeter.

11.3 Describe the construction of analog multimeter

11.4 Describe the construction of digital multimeter.

**12. Understand the features of oscilloscope.**

12.1 State the basic principle of oscilloscope.

12.2 Mention the important features of cathode ray tubes (CRT).

12.3 Describe the function of sweep generator.

12.4 Describe the block diagram of oscilloscope.

12.5 Describe the operation of dual beam CRO.

12.6 Describe the operation of dual trace oscilloscope.

12.7 Describe the operation of storage oscilloscope.

12.8 Explain the method of measurement of phase angle and frequency by lissajous pattern.

12.9 Describe the characteristics of CRO probe.

**13. Understand the features of signal generator.**

13.1 Describe the operation of AF sine and square wave generator.

13.2 Describe the operation of function generator.

13.3 Explain the function of TV sweep generator.

13.4 Describe the operation of video pattern generator.

13.5 Describe the operation of color bar generator.

**14. Understand the features of wave analyzer.**

14.1 State the principle of basic wave analyzer.

14.2 Describe the operation of heterodyne wave analyzer.

14.3 Describe the basic principle of harmonic distortion analyzer.

14.4 Explain the function of spectrum analyzer.

**Practical:**

**1. Study the various types of measuring instruments.**

1.1 Select at least eight different measuring instruments.

1.2 Identify the types of given instruments for measuring electrical quantities.

1.3 Observe the ranges of instruments.

**2. Study the operation of indicating, integrating, recording and digital instruments.**

2.1 Choose one indicating, one integrating, one recording and one digital instrument.

2.3 Select the tools and materials required.

2.4 Connect each instrument to the supply system with proper load, if necessary.

2.6 Observe the operation of moving system of each instrument.

**3. Study the parts of different types of measuring instruments.**

3.1 Select two types of measuring instruments.

3.2 Disassemble the magnet, moving iron parts, controlling and damping

3.3 parts, pointer, scale and case.

3.4 Observe the balancing system of the moving parts.

- 3.5 Assemble the parts as original.
- 4. Select the correct type of ammeter and voltmeter.**
  - 4.1 Collect some ammeters and voltmeters.
  - 4.2 Collect required numbers of tools to open ammeters and voltmeter.
  - 4.3 Disassemble the parts of the instrument.
  - 4.4 Identify the controlling and damping system.
  - 4.5 Identify the parts of the meter.
  - 4.6 Identify the types of meter.
- 5. Measure voltage, time period and frequency using a CRO.**
  - 5.1 Select a CRO and some signal source for measurement.
  - 5.2 Connect the signal probe to oscillator input.
  - 5.3 Switch on the power supplies.
  - 5.4 Adjust the voltage and sweep selector knob.
  - 5.5 Adjust other required controls.
  - 5.6 Observe the wave shape.
  - 5.7 Record horizontal distance and vertical distance for a single wave.
  - 5.8 Calculate voltage, time period and frequency from the knob's settings.
- 6. Measure the rise, fall and delay time using a CRO.**
  - 6.1 Select the appropriate oscilloscope, required signal source and materials.
  - 6.2 Connect the signal input to the oscilloscope.
  - 6.3 Switch on the power supply.
  - 6.4 Make required adjustments.
  - 6.5 Observe the condition of the signal.
  - 6.6 Determine the value of rise, fall and delay time from the conditions.
- 7. Test the operation of a function generator.**
  - 7.1 Select pulse generator and required equipment & materials.
  - 7.2 Connect the output of the pulse generator to the CRO.
  - 7.3 Switch on the power supply.
  - 7.4 Make adjustment of function generator.
  - 7.5 Observe the wave shapes of the oscilloscope.
- 8. Check the calibration of low frequency and high frequency signal generator using AC milli voltmeter, calibrated CRO and digital frequency counter.**
  - 8.1 Select the low frequency, high frequency oscillators and required measuring equipments.
  - 8.2 Set the oscillator selector switches at mid position and increase or decrease in steps.
  - 8.3 Check the voltage with AC milli voltmeter.
  - 8.4 Compare the value with the calibration.
  - 8.5 Check the frequency calibration with CRO and digital frequency meter.
  - 8.6 Check the other parameters such as time period.

## **REFERENCE BOOKS**

1. Measurement & Measuring Instruments  
– Goldings
2. A course in Electrical and electronic measurements and instrumentation  
– A. K. Sawhrey.
3. A Text Book of Electrical Technology  
– B.L. Theraja
4. Electric Instrumentation  
– H. S. Kalsi

**AIMS**

To provide the students with an opportunity to acquire knowledge, skill and attitude in the area of advanced communication system with special emphasis on:

- Different switching systems and DSL technology
- Optical fiber communication system , Optical fiber and light sources for optical fiber
- satellite communication system
- Special purpose satellite
- SONET, ATM, ISDN
- Mobile communication
- Networks
- Mobile communication and cellular telephone

**SHORT DESCRIPTION**

Switching systems, ADSL, Optical fiber, light source for optical fiber, optical fiber communication systems, satellite communication, satellite ground station, special purpose communication satellite, satellite applications, ATM, SONET, ISDN, Interface standard, LAN, WAN, Advanced network and mobile communication.

**DETAIL DESCRIPTION****Theory:**

## DETAIL DESCRIPTION

## THEORY:

- 1 Understand Communication Switching System.
  - 1.1 Mention the elements of communication switching system
  - 1.2 Describe the criteria for the design of Telecommunication system.
  - 1.3 Explain the centralized switching and distributed switching.
  - 1.4 Discuss the typical hierarchical network structure.
  
- 2 Understand Electronic Switching System
  - 2.1 Mention the classification of switching system.
  - 2.2 Discuss the functions of switching system.
  - 2.3 Recognize the requirements of switching system.
  - 2.4 Explain centralized and distributed SPC switching system.

- 2.5 Discuss circuit switching, message switching and packet switching.
- 3 Understand Digital Switching System.
  - 3.1 Define digital switching.
  - 3.2 Mention the evaluation of digital switching.
  - 3.3 Mention the advantages and disadvantages of digital transmission.
  - 3.4 Describe the digital signal encoding formats.
  - 3.5 Discuss asynchronous and synchronous transmission.
  - 3.6 Describe space division switching.
  - 3.7 Describe analog time division and digital time division switching.
  - 3.8 Explain ST, TS, STS & TST SWITCHING.
- 4 Understand Digital subscriber Line (DSL) Technology
  - 4.1 Define XDSL & ADSL.
  - 4.2 Mention various types of XDSL.
  - 4.3 State the principle of XDSL
  - 4.4 Discuss encoding and modulation in XDSL.
  - 4.5 Mention the frequency spectrum of ADSL.
  - 4.6 Describe the topology & frame format for ADSL system.
  - 4.7 Mention the capabilities of ADSL.
  - 4.8 Mention the advantages of ADSL.
- 5 Understand the optical fiber communications.
  - 5.1 Mention the electromagnetic spectrum showing the region used for optical fiber communications
  - 5.2 Describe the block diagram of an optical fiber communication system.
  - 5.3 Define optical fiber.
  - 5.4 Describe the basic structure of an optical fiber.
  - 5.5 Explain propagation of light waves in optical fiber.
  - 5.6 Illustrate the acceptance angle, and numerical aperture of a fiber.
  - 5.7 Describe the types of optical fiber.
  - 5.8 Describe the dispersion in an optical fiber.
  - 5.9 Describe the construction of optical fiber cables.
  - 5.10 Mention the advantages and disadvantages of optical fibers.
- 6 Understand the light sources and detector for optical fibers.
  - 6.1 Describe the structure of LED.
  - 6.2 Explain the method of fiber LED coupling.
  - 6.3 Describe the laser operation.
  - 6.4 Describe the structure of semiconductor laser diode.
  - 6.5 Mention the advantages of semiconductor laser diode.
  - 6.6 Describe the basic principle of photo detectors.
  - 6.7 State the characteristics of photo detector.
- 7 Understand optical fiber joints, couplers and isolators
  - 7.1 List the possible misalignment occur during fiber joints
  - 7.2 Mention the connection problems when joining fibers
  - 7.3 Define fiber splice

- 7.4 Describe different fiber splices
  - 7.5 Recognize different types fiber connectors
  - 7.6 Discuss fiber couplers
  - 7.7 Describe optical Isolators and circulators
- 8 Understand the satellite communication.
- 8.1 Define the term satellite.
  - 8.2 State the classification of satellite.
  - 8.3 Mention the frequency allocations and band spectrum of satellite communication.
  - 8.4 Describe the general structure of satellite communication system.
  - 8.5 Describe the satellite orbits.
  - 8.6 State the footprint of a satellite and solar eclipse.
  - 8.7 Explain the satellite location with respect to earth.
- 9 Understand the communication satellite subsystem.
- 9.1 Describe the satellite earth station with block diagram.
  - 9.2 Describe the block diagram of the Transponder.
  - 9.3 Discuss the telemetry system of communication satellites.
  - 9.4 Describe the command system of communication satellites.
  - 9.5 Discuss the tracking and ranging system of communication satellites.
  - 9.6 Explain the attitude control of satellite with block diagram.
  - 9.7 Describe the components of satellite electric power system.
- 10 Understand the special purpose communication satellite.
- 10.1 Describe the very small terminals (VSATs).
  - 10.2 Describe the function of international telecommunication satellite (INTERSAT).
  - 10.3 Describe mobile satellite (MSAT) communication system..
  - 10.4 Explain the Global positioning system (GPS).
  - 10.5 Describe the block diagram of a handheld GPS receiver.
  - 10.6 Compare the satellite communication with respect to fiber optic communication.
  - 10.7 Mention the fields of satellite application.
- 11 Understand the data communication network.**
- 11.1 Define the term network.
  - 11.2 State the types of network.
  - 11.3 Describe the network topologies.
  - 11.4 State the various data-link protocols.
  - 11.5 Explain the term Token passing and VOIP.
  - 11.6 Describe the Ethernet.
  - 11.7 Illustrate the function of modem.
- 12 Understand Synchronous Optical Network (SONET)
- 11.1 Define SONET & SDH
  - 11.2 Mention the characteristics of SONET.
  - 11.3 State SONET Signal Hierarchy.

- 11.4 Mention SONET components.
  - 11.5 Discuss SONET Network and Layers.
  - 11.6 Recognize the SONET Frame Format.
  - 11.7 Describe SONET Multiplexing.
  - 11.8 Explain SONET Topologies.
- 13 Understand ATM technology.
- 13.1 Define ATM technology.
  - 13.2 List the Advantages of ATM.
  - 13.3 Explain the concepts of ATM.
  - 13.4 Discuss ATM Header Structure.
  - 13.5 Describe ATM Layers.
- 14 Understand The integrated Services Digital Network (ISDN).
- 14.1 Define ISDN.
  - 14.2 Mention the ISDN services.
  - 14.3 List the advantages of ISDN.
  - 14.4 Describe the ISDN interfaces.
  - 14.5 Describe the ISDN channels.
  - 14.6 Describe the ISDN switching, functional grouping and reference points.
- 15 Understand mobile communication.
- 15.1 Define mobile communication.
  - 15.2 State the Cellular telephone system.
  - 15.3 Describe the basic composition of mobile communication system.
  - 15.4 Explain the generation of the Cellular telephone system.
  - 15.5 Describe cell splitting, frequency reuse, roaming, and handoff in cellular telephone.
  - 15.6 Mention the channels and bands of the different Cellular telephone system.
  - 15.7 Describe the subscriber identification techniques.
- 16 Understand Cellular telephone network
- 16.1 Explain the term GSM network.
  - 16.2 Describe the architecture of The GSM network.
  - 16.3 Describe the typical call flow sequence in GSM (location updating, mobile call origination mobile call termination, authentication and encryption) .
  - 16.4 State the basic principle of CDMA.
  - 16.5 Mention the CDMA frequency and channel allocations.
  - 16.6 Describe Short Message Management Protocol.
  - 16.7 Describe the block diagram of a modern mobile phone hand set.
  - 16.8 Explain the term Bluetooth, WiMAX & WAP.

**Practical:**

1. *Observe the frequency response of Fiber optic Receiver.*
2. *Perform voice communication Using MIC, Speaker and OF.*
3. *Study the voice communication using AM receiver and optical fiber Link.*
4. *Study the voice communication using FM receiver and optical fiber Link.*
5. *Study the connection & operation of MODEM (Modulation/Demodulation) in the PC.*
7. *Study the FSK modulator and demodulator trough OF.*
8. Study the ASK modulator and demodulator trough OF.
9. *Identify with physical layout, location of stages and major components of a cellular phone.*
10. Install the LAN (Local Area Network) in your computer Lab.
11. Visit nearest MSC, BSS, Railway station, ISP, Ground satellite station and write a report on your visit.

#### **REFERENCE BOOKS**

1. Telecommunication Switching and Networks  
- P. Gnanasivam
2. Data Communication and Networking  
- Behrouz A. Forouzan
3. Principles of Communications Satellites.  
- Gray D. Gordon and Walter L. Morgan.
4. Mobile and Personal Communication Systems and Services.  
- Raj Panday
5. Optical fiber communication principles and practice,  
- John M. Senior..

**6854 ELECTRONIC COMPUTER AIDED DESIGN (ECAD) T P C**  
**0 6 2**

**AIMS**

- To assist to acquire the skills needed for drawing & designing by ECAD package.
- To provide the skill needed for PCB design and schematic drawing by typical package.
- To provide the skill needed for making PCB designed by ECAD.

**SHORT DESCRIPTION**

Setting up drawing environments and aids; Drawing and editing schematic circuits; Analyzing a schematic Circuit; Organizing the drawing information on layers; Exporting PCB Netlist; Creating a simple PCB layout; editing the PCB layout; Printing, plotting PCB layout and making PCB.

**DETAIL DESCRIPTION**

**1. Set up the drawing environment and drawing aids.**

- 1.1. Start an ECAD Package and identify the different areas of ECAD screen.
- 1.2. Identify the menu bar, toolbar, drawing area and special windows for circuit simulation and testing purpose.
- 1.3. Familiarize with tools, toolkits and buttons (such as arrow, wire, text, delete etc)
- 1.4. Familiarize with workspace, conventions, preferences, shortcuts and hotkeys.
- 1.5. Place components such as resistors, transistors, power supply etc.
- 1.6. Save the drawing environment.
- 1.7. Exit from the ECAD package.

**2. Draw schematic Circuit.**

- 2.1 Select an electronic Circuit diagram.
- 2.2 Place Devices according to circuit diagram (such as resistors, transistors, IC, power supply, grounds etc) in the workspace Selected ECAD package.
- 2.3 Wire devices together.
- 2.4 Edit devices with values and parameters.

**3. Analyze a schematic Circuit.**

- 3.1 Add device meter to circuit diagram and set device meter values.
- 3.2 Simulate the circuit.
- 3.3 View Circuit voltage and current or digital logic level.
- 3.4 Change a device value and quickly analyze the circuit.
- 3.5 Perform DC and AC analysis of the circuit using circuit analyzer/oscilloscope.

**4. Organize the drawing information on layers.**

- 4.1. Identify the layer control options.
- 4.2. Create and name the layers.
- 4.3. Make the layer current and control layer visibility.
- 4.4. Freeze, lock and unlock the layers.
- 4.5. Set the layer color & line type.

**5. Export PCB Netlist.**

- 5.1. Familiarize PCB Netlist requirement.
- 5.2. Create a PCB Netlist file.

- 5.3. Export the PCB Netlist file in appropriate format.
  - 5.4. Run appropriate PCB layout and auto routing Program.
  - 5.5. Load PCB Netlist file.
  - 5.6. Define the board size.
  - 5.7. Use auto placement feature for placing Netlist component on the board.
- 6. Create a simple PCB layout.**
- 6.1 Select the schematic diagram comprising of resistors, capacitors, transistors, op-amps, logic gates, etc.
  - 6.2 Run any professional PCB layout packages.
  - 6.3 Load the layout drawing (symbols, pads, lines, components, etc.) from the components library.
  - 6.4 Configure the system for units and co-ordinates.
  - 6.5 Use commands to display the grids.
  - 6.6 Zoom and unzoom the drawing area.
  - 6.7 Connect the pads with tracks to make the schematic circuit diagram.
  - 6.8 Save & exit the layout.
- 7. Edit the PCB layout.**
- 7.1 Load or open the PCB layout.
  - 7.2 Delete & insert the nodes, track and layout entities.
  - 7.3 Change the size and shape of pad, track and symbols.
  - 7.4 Duplicate and rearrange the layout entities (use copy, move & rotate commands).
  - 7.5 Change the width of the tracks.
  - 7.6 Set up & use layouts and colors.
  - 7.7 Include the text in the layout.
  - 7.8 Save the PCB layout.
- 8. Print and plot the PCB layout.**
- 8.1 Open the PCB layout.
  - 8.2 Select the output format.
  - 8.3 Set up the printing options.
  - 8.4 Set up the area of plot size.
  - 8.5 Compensate for printer or plotter in accuracy.
  - 8.6 Print on tracing paper PCB layout.
- 9. Make the photo resist coating emulsion.**
- 9.1 Select the required materials such as photoresist and dichromate.
  - 9.2 Prepare photo coating emulsion.
- 10. Make the PCB using screen printing techniques.**
- 10.1 Select the required frame with silkscreen.
  - 10.2 Take printed tracing paper PCB layout.
  - 10.3 Prepare the screen by proper steps for PCB printing.
  - 10.4 Prepare the PCB by proper steps.
- 11. Build the project.**
- 11.1 Place the components on the PCB.
  - 11.2 Solder the components.
  - 11.3 Test the circuit for proper operation.

**NB: Students can select projects from the following list.**

- i) Regulated power supply.
- ii) Timers using 555 and other oscillators.
- iii) Clapping switch and IR switch.
- iv) Blinkers.
- v) Sirens and hooters.
- vi) Single band AM or FM Radio receiver.
- vii) Cell charger, battery charger, mobile charger.
- viii) Fire or smoke alarm.
- ix) Liquid level controller.
- x) Counters.
- xi) Combination locks.
- xii) Electronic musical instruments.
- xiii) Audio amplifiers.
- xiv) Automotive stabilizer/CVT.
- xv) Emergency light.
- xvi) Fan regulator.

**AIMS**

- To be able to acquire the knowledge & skill on counters, shift registers and their applications.
- To be able to acquire the knowledge & skill on semiconductor memories & ALU
- To be able to acquire the knowledge & skill on A/D and D/A converters
- To familiarize with PLD & simple computer (SAP-1)

**SHORT DESCRIPTION**

Sequential system concept; Flip-flops; Registers & counters;  
Semiconductor Memories; A/D & D/A converters, PLD and SAP-1.

**DETAIL DESCRIPTION****Theory:****1. Understand the clocked Flip Flops.**

- 1.1 Describe the operation of sequential logic system with block diagram.
- 1.2 Define the synchronous and asynchronous sequential logic circuit.
- 1.3 State the concept of level clocking and edge triggering.
- 1.4 Explain the operation of clocked SR Flip Flop.
- 1.5 State the advantages of edge triggering in Flip Flop.
- 1.6 Explain the operation of clocked D, T, JK and Master-slave Flip Flops.
- 1.7 Describe the operation of RS Flip Flop as a de-bounce switch.
- 1.8 Describe the operation of Flip Flop as a frequency division circuit.
- 1.9 State the application field of Flip Flops.

**2. Understand registers and its application.**

- 2.1 Define register.
- 2.2 Mention different types of registers.
- 2.3 Mention the use of shift registers.
- 2.4 List the different types of common shift register IC chips
- 2.5 Describe the operation of buffer register.
- 2.6 Explain the basic principle of operation of serial in - serial out shift registers.
- 2.7 Explain the operation of parallel in- parallel out shift registers.
- 2.8 Describe the operation of left shift, right shift and universal shift registers.
- 2.9 Describe the states (both two and three) of registers.

**3. Understand the binary counter circuits.**

- 3.1 Define binary counter.
- 3.2 State the difference between asynchronous and synchronous counter.
- 3.3 Explain the operation of asynchronous, synchronous and decade counter.
- 3.4 State the modulus of a counter.
- 3.5 Describe the principle of divide - by- n counter.
- 3.6 Describe the operation of a binary up - down counter.
- 3.7 State the principle of ring & Johnson counter.
- 3.8 State the application of different types of counters.
- 3.9 Describe the operation of digital clock.

**4. Understand semiconductor memories.**

- 4.1 List the type of memories.
- 4.2 Describe the principle of serial and parallel access memory.
- 4.3 Explain the internal organization of semiconductor memory.

- 4.4 Describe the technique of memory addressing.
- 4.5 Explain the read and write operation of semiconductor memory.
- 4.6 Explain the principle of static and dynamic RAM.
- 4.7 Describe the principle and operation of ROM, PROM, EPROM and EEPROM.
- 4.8 List the application of some commercial memory ICs.

#### **5. Understand arithmetic logic circuit.**

- 5.1 Mention the basic principle of ALU.
- 5.2 List the application of ALU.
- 5.3 Identify some commercial ALU chips.
- 5.4 Mention the principle of digital comparators.
- 5.5 Mention the principle of binary rate multiplier with block diagram.
- 5.6 List the application of digital comparators.
- 5.7 Identify some commercial comparators and binary rate multiplier ICS.

#### **6. Understand D/A converter.**

- 6.1 Mention the principle of level conversion.
- 6.2 Describe the principle of D/A conversion.
- 6.3 Mention the types of D/A converter.
- 6.4 Explain the operation of a binary weighted D/A and R-2R ladder D/A converter.
- 6.5 State the terms – resolution, percentage resolution, and accuracy, offset error and settling time as specification of D/A converter.
- 6.6 Solve problems on resolution, full scale output current, output voltage and accuracy of D/A converter.
- 6.7 State the application field of D/A converter.
- 6.8 List the application of popular D/A converter ICS.

#### **7. Understand A/D converter.**

- 7.1 State the general principle of A/D conversion
- 7.2 List the type of A/D converter.
- 7.3 State the working principle of 3-bit parallel A/D converter.
- 7.4 Describe the operation of Digital Ramp A/D converter
- 7.5 Explain the operation of successive approximation, dual slope and Flash A/D converter.
- 7.6 State the terms – resolution, accuracy, and conversion time as specification of A/D converter.
- 7.7 List the applications of popular A/D converter ICS.
- 7.8 Describe the operation of sample & hold circuits and its application.

#### **8. Understand the programmable logic devices.**

- 8.1 Defines PLD.
- 8.2 State the advantages of PLD.
- 8.3 Describe the principle of PLD.
- 8.4 Discuss simplified logic diagram of PLA, PAL and GAL.
- 8.5 Describe the architecture of two input PLA, PAL and GAL.
- 8.6 State the basic feature of FPGA.
- 8.7 Describe the programming process SPDL
- 8.8 Describe the complex programmable logic device (CPDL).
- 8.9 Interpret standard PAL and GAL numbering.

#### **9. Understand the organization of a SAP-1**

- 9.1 State the meaning of SAP.
- 9.2 State the function of each stage of SAP-1 with block diagram.
- 9.3 State the function of control signals i.e. Enable, Load, Clock and
- 9.4 Clear of each register.
- 9.5 State the instruction for accessing and storing data in RAM of SAP-1.

9.6 Describe the bus organization of SAP- 1.

**10. Understand the Micro and Macro Instruction of SAP-1**

- 10.1 Describe the function of controller sequencer.
- 10.2 State the control word/micro instruction of controller sequencer.
- 10.3 State the meaning of macro instructions and their corresponding binary op-code used in SAP-1
- 10.4 State the concept of machine cycle, fetch cycle, execution cycle and instruction cycle
- 10.5 Describe the fetching steps of micro instruction in different T states.
- 10.6 Describe the execution steps of micro instruction in different T states.

**Practical:**

- 1. To prepare the clocked RS, D, T, JK & Master-slave flip-flops and check its truth table/operations.
- 2. To prepare different types of shift registers and check its operation.
- 3. To prepare different types of counter and check its operation.
- 4. To prepare an asynchronous binary counter and check the output.
- 5. To prepare a synchronous decade counter and check the output.
- 6. Check the operation of ALU.
- 7. To show the read / write operation of a 4 bit memory chip.
- 8. To show the D/A conversion procedure of D/A converter.
- 9. To show the A/D conversion procedure of A/D converter.
- 10. To the operation of digital clock
- 11. To the operation of digital voltmeter.
- 12. Construct and verify the operation of SPLD by using logic gates.

**REFERENCE BOOKS**

- 1. Digital principles and application – A P Malvino
- 2. Digital Computer Electronics – A P Malvino
- 3. Digital System – Tocci
- 4. Modern Digital Electronics - R. P. Jain
- 5. Digital Fundamentals. – FLOYD

## OBJECTIVES

- To develop knowledge and skill to prepare programs in C.
- To develop knowledge and skill to create, compile, debug & execute C programs.

## SHORT DESCRIPTION

Basics of C program; Data types; Variables; Operators; Expressions; Input-Output statements; Branching and Looping statements; Arrays; preprocessors, Functions, Pointers; Structures and Unions; File operations and Graphics.

## DETAIL DESCRIPTION

Theory:

## 1 Understand fundamentals of C Programming

- 1.1 Describe the historical development of C Programs.
- 1.2 Describe the Basic structure of C program and programming style .
- 1.3 State the difference of C with other high level languages.
- 1.4 Explain the process of program planning.
- 1.5 Describe algorithm and flow chart.
- 1.6 Prepare algorithm and flow chart for simple problems.
- 1.7 State the process of compiling C program.
- 1.8 Write simple programs using basic structure of C program.

## 2 Understand data types, constants and variables.

- 2.1 Describe the data types in C.
- 2.2 Explain constants and variables in C.
- 2.3 Describe the keywords and identifiers in C.
- 2.4 Mention the use of qualifiers in data types.
- 2.5 Declare variables and assign values to variables.
- 2.6 State the type conversion and type definition in C.
- 2.7 Write simple programs using constants and variables.

## 3 Understand Operators and Expressions.

- 3.1 State C operators and their classification.
- 3.2 Describe the arithmetic, relational, logical, assignment, increment, decrement and conditional operators.
- 3.3 Explain the bitwise and special operators.
- 3.4 Write arithmetic expression & its evaluation.
- 3.5 Describe the precedence of arithmetic operators.
- 3.6 Mention operator precedence and associativity.
- 3.7 Write simple programs using operators and expressions.

## 4 Understand the input and output operations.

- 4.1. Describe the statement getting input from keyboard.
- 4.2. Describe the statements printing output on screen and by printer.
- 4.3 State the codes used for formatted I/O.Statements.
- 4.4 Mention the escape sequence in C.
- 4.5 Write programs using I/O statements.

## 5 Understand the Branching and Looping Statements.

- 5.1 Describe the conditional and unconditional branching flow.
- 5.2 State the statement for conditional and unconditional branching.
- 5.3 Explain the format for branching statements.

- 5.4 Describe the conditional and unconditional Looping flow.
- 5.5 State the statement for conditional and unconditional Looping.
- 5.6 Explain the format for looping statements
- 5.7 Write programs using branching and looping statements.
- 6 Understand arrays
  - 6.1 Define arrays
  - 6.2 Describe the dimension of arrays.
  - 6.3 Initialize arrays.
  - 6.4 Write programs using arrays.
- 7. Understand preprocessor statements in C.
  - 7.1 Describe the preprocessor directives and their functions.
  - 7.2 Define header.
  - 7.3 Describe the process of including header in routine.
  - 7.4 Explain the use of macro.
  - 7.5 Describe the advantage of macros over functions in programs
  - 7.6 Write programs using preprocessor statements.
- 8 Understand pointer and its application.
  - 8.1 Define pointer.
  - 8.2 Describe the characteristics of pointer.
  - 8.3 Explain pointer expressions.
  - 8.4 Write programs using pointers.
- 9 Understand Function.
  - 9.1 Explain library function and user defined function.
  - 9.2 Describe the process of calling functions and returning values from functions in C.
  - 9.3 Describe arguments used in functions.
  - 9.4 Mention function prototype.
  - 9.5 Write programs using library function and user defined function..
- 10 Understand structure and union.
  - 10.1 Describe structure and union.
  - 10.2 Mention structure and union declaration.
  - 10.3 Distinguish between structure and union.
  - 10.4 Write simple programs using structure and union.
- 11 Understand file operations.
  - 11.1 Describe file operations.
  - 11.2 State the modes of opening files.
  - 11.3 Describe the functions that support character I/O.
  - 11.4 Explain the routines for performing formatted I/O to files
  - 11.5 Write programs for reading, writing and editing files.
- 12 Understand graphics elements and its application in C.
  - 12.1 Define Text and Graphics
  - 12.2 Describe how graphics are created in computers.
  - 12.3 State the concept of pixel and resolution of CRT/LCD/LED display.
  - 12.4 State the format and use of line( ), rectangle( ), bar( ), bar3d( ), Circle( ), ellipse( ), fillellipse( ) and sector( ) functions with example
  - 12.5 State the format and use of Arc( ), pieslice( ), drawpoly( ) and fillpoly( ) outtextxy( ) & settextstyle( ), cleardevice( ), delay( ), sound( ) & nosound( ),

functions with example

- 12.6 Mention the use of modified `printf( )` and `cscanf( )` functions for I/O operation.
- 12.7 Write program for developing color image using above graphics functions.
- 12.8 State the procedure of saving and loading an image in C.
- 12.9 Show the procedure to move text string on the screen.
- 12.10 Describe the statements used to copy and move text and graphics.
- 12.11 Write programs to create simple graphics.

Practical:

1. Perform the task to create, compile, debug & execute a C programs
  - a) To print a message.
  - b) To add two integer/float numbers.
2. Perform the task to create, compile, debug & execute a C programs using constants and variables
  - a) To calculate the average of N numbers.
  - b) To convert the given temperature in Fahrenheit to Celsius and vice versa.
  - c) To calculate the area of a circle.
3. Perform the task to create, compile, debug & execute a C programs using operators and expressions.
  - a) To convert days to months and days.
  - b) To calculate the area of a triangle.
  - c) To compare two integer numbers
4. Perform the task to create, compile, debug & execute a C programs using I/O statements
  - a) To read integer/real number.
  - b) To find the sum of three floating point numbers from keyboard.
  - c) To convert centimeter to inch using `scanf ( )` and `Printf ( )` statements.
5. Perform the task to create, compile, debug & execute a C programs using Branching Statements.
  - a) To select and print the largest number of three numbers.
  - b) To compute the roots of a quadratic equation.
  - c) To count vowels from a string of ten characters using switch statement.
- 6 Perform the task to create, compile, debug & execute a C programs using Looping Statements
  - a) To print odd or even numbers from N numbers.
  - b) To find the maximum or minimum number from a set of numbers.
  - c) To search prime numbers.
- 7 Perform the task to create, compile, debug & execute a C programs using arrays
  - a) To sort numbers in ascending or descending order using one dimensional array.
  - b) To print numbers in two dimensional form.
  - c) for matrix multiplication.
- 8 Perform the task to create, compile, debug & execute a C programs using preprocessor statements.
  - a) To determine hypotenuse of right angled triangle using macro.
  - b) To determine the area of a triangle using nested macro.
- 9 Perform the task to create, compile, debug & execute a C programs using pointers
  - a) To illustrate the use of pointers in arithmetic operations.
  - b) To compute the sum of all elements stored in an array.
- 10 Perform the task to create, compile, debug & execute a C programs using functions
  - a) To calculate the area of a triangle
  - b) To sort an array of integer numbers.

- c) To calculate factorial of any integer using recursive function.
- 11 Perform the task to create, compile, debug & execute a C programs using structure and union
  - a) To store and retrieve data using structure.
  - b) To store and retrieve data using union.
- 12 Perform the task to create, compile, debug & execute a C programs using files
  - a) To store/read information to/from sequential file.
  - b) To store/read information to/from random file.
  - c) To convert lower case to upper case and vice versa.
- 13 Perform the task to create, compile, debug & execute a C programs using graphics
  - a) To draw a line with different styles.
  - b) To draw a circle with different colors.
  - c) To generate nested ellipse.
- 14. To develop a complete project using C program that include text, graphics and sound in VGA mode.

Reference books and sites:

1. programming in C – E. Balagurusamy.
2. Teach yourself C \_ Herbert Schildt.
3. [www.e-booksdirectory.com](http://www.e-booksdirectory.com) › Computers & Internet
4. [www.freebookcentre.net](http://www.freebookcentre.net) › Programming Languages Books
- 5 [www.4shared.net/c+programming+ebook](http://www.4shared.net/c+programming+ebook)

**5851 BOOK KEEPING & ACCOUNTING**

**T P C**  
**2 0 2**

**AIMS**

- To be able to understand the principles and practices of book keeping and accounting.
- To be able to understand the procedures of general accounting, financial accounting and their applications.

**SHORT DESCRIPTION**

Concept of book keeping and accounting; Transactions; Entry systems; Accounts; Journal; Ledger; Cash book; Trial balance; Final accounts; Cost account & financial accounting; Depreciation; Public works accounts.

**DETAIL DESCRIPTION**

**1 Understand the concept of book keeping and accounting.**

- 1.1 Define book keeping and accountancy.
- 1.2 State the objectives of book keeping.
- 1.3 State the advantages of book keeping.
- 1.4 Differentiate between book keeping and accounting.
- 1.5 State the necessity and scope of book keeping and accounting.

**2 Understand the transactions.**

- 2.1 Define transactions and business transaction.
- 2.2 Explain the importance of transactions.
- 2.3 Describe the characteristic features of transactions.
- 2.4 Discuss the classification of transaction.
- 2.5 Identify the transaction from given statements stating reasons.

**3 Understand the entry system.**

- 3.1 State the aspects of transactions.
- 3.2 Define single entry system.
- 3.3 State the objectives of single entry system.
- 3.4 Discuss the disadvantages of single entry system.
- 3.5 Define double entry system.
- 3.6 Discuss the principles of double entry system.
- 3.7 Justify whether double entry system is an improvement over the single entry system.
- 3.8 Distinguish between single entry and double entry system of book keeping.

**4 Understand the classification of accounts.**

- 4.1 Define accounts.
- 4.2 State the objectives of accounts.
- 4.3 Illustrate different type of accounts with example.
- 4.4 Define "Golden rules of Book keeping".
- 4.5 State the rules for "Debit" and "Credit" in each class of accounts.
- 4.6 Determine Debtor (Dr) and Creditor (Cr.) from given transactions applying golden rules.
- 4.7 Define accounting cycle.
- 4.8 State the different steps of accounting cycle.

**5 Understand the Journal.**

- 5.1 Define Journal.
- 5.2 State the object of Journal.

- 5.3 State the functions of Journal.
- 5.4 Mention the various names of Journal.
- 5.5 Interpret the form of Journal.
- 5.6 Journalize from given transactions.

#### **6 Understand the ledger.**

- 6.1 Define ledger.
- 6.2 Interpret the form of ledger.
- 6.3 State the functions of ledger.
- 6.4 Distinguish between Journal and Ledger.
- 6.5 Prepare ledger from given transactions.
- 6.6 Explain why ledger is called the king of all books of accounts.

#### **7 Understand the cash book.**

- 7.1 Define cash book (single, double and triple column).
- 7.2 Explain cash book as both Journal and Ledger.
- 7.3 Prepare double column cash book from given transactions showing balances.
- 7.4 Prepare triple column cash book from given transaction and find out the balances.
- 7.5 Define petty cash book.
- 7.6 Prepare analytical and imprest system of cash book.
- 7.7 Define discount.
- 7.8 Explain the different types of discount.

#### **8 Understand the trial balance.**

- 8.1 Define trial balance.
- 8.2 State the object of a trial balance.
- 8.3 Discuss the methods of preparation of a trial balance.
- 8.4 Explain the limitations of a trial balance.
- 8.5 Prepare trial balance from given balance.

#### **9 Understand the final accounts.**

- 9.1 State the components of final account.
- 9.2 Distinguish between trial balance and balance sheet.
- 9.3 Identify the revenue expenditure and capital expenditure.
- 9.4 Select the items to be posted in the trading account, profit & loss account and the balance sheet.
- 9.5 State the adjustment to be made from the given information below or above the trial balance.
- 9.6 Prepare trading account, profit & loss account and balance sheet from the given trial balance & other information.

#### **10 Understand the cost and financial accounting.**

- 10.1 Define financial accounting.
- 10.2 State the objectives of financial accounting.
- 10.3 Define cost accounting.
- 10.4 Discuss the relationship between financial Accounting and cost accounting.
- 10.5 State the elements of direct cost and indirect cost.

- 10.6 Prepare cost sheet showing prime cost, factory cost, cost of production, total cost and selling price.
- 10.7 Discuss the capital budgeting
- 10.8 Discuss the discounted cash flow method
- 10.9 Explain the following terms:
  - a. Fixed cost b. Variable cost c. Factory cost d. Overhead cost e. Process cost
  - f. Direct cost g. Operating cost h. Standard cost

### **11 Understand the depreciation**

- 11.1 Define depreciation.
- 11.2 State the objects of depreciation.
- 11.3 Discuss the necessity for charging depreciation.
- 11.4 Describe the different methods of determining depreciation.
- 11.5 Explain the relative merits and demerits of different method of depreciation.

### **12 Understand the public works accounts.**

- 12.1 State the important aspects of public works accounts.
- 12.2 Describe the main features of public works accounts.
- 12.3 Explain "Revenue and Grant".
- 12.4 Define Value Added Tax (VAT)
- 12.5 State the merits and demerits of VAT.
- 12.6 Define Bill and Voucher.