

BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM SYLLABUS (PROBIDHAN-2016)

ELECTRONICS TECHNOLOGY

TECHNOLOGY CODE: 668

5th SEMESTER

DIPLOMA IN ENGINEERING PROBIDHAN-2016

ELECTRONICS TECHNOLOGY (668)

SI. No	Subject Code	Name of the subject	т	Р	с	Marks				
						Theory		Practical		Total
						Cont.	Final	Cont.	Final	TOLAI
						assess	exam	assess	exam	
1	66851	Radio & Television Engineering	3	3	4	60	90	25	25	200
2	66852	Electronic Measuring Instruments	2	3	3	40	60	25	25	150
3	66853	Advanced Communication Engineering	3	3	4	60	90	25	25	200
4	66854	Advanced Digital Electronics	3	3	4	60	90	25	25	200
5	66855	Electronic Servicing -II	0	3	1	-	-	25	25	50
6	69054	Environmental Studies	2	0	2	40	60	-	-	100
7	65851	Accounting Theory & Practice	2	3	3	40	60	50	-	150
Total			15	18	21	300	450	175	125	1050

5th SEMESTER

66851 Radio & Television Engineering

T P C 3 3 4

OBJECTIVES

Upon completion of these content student will be able to achieve and acquire knowledge, skills and attitude in the area of radio & television engineering special emphasis on:

- Radio wave & its applications.
- TV Communication System.
- TV Transmission & Reception.
- Circuits of TV Receiver.
- Digital TV System.

SHORT DESCRIPTION

Radio wave & its applications: Picture Signal, Principle of TV Signal Propagation, Factors related with TV Communication system, TV Camera, TV signal (CVS/CCVS) Processing, Block diagram of TV Transmitter & Receiver, Picture Tube, Circuit Diagram of TV Receiver, TV Transmitting & Receiving Antenna, Booster, Test signal and Test equipment, Digital Television System.

DETAIL DESCRIPTION

Theory:

1. Understand the Radio frequency spectrum & its applications.

- 1.1 Define radio wave.
- 1.2 Classify Radio wave & its allocation.
- 1.3 Describe electromagnetic wave.
- 1.4 Describe the radiation properties of electromagnetic wave.
- 1.5 Civil applications of radio wave.

2. Understand the Picture signal & TV Signal Processing.

- 2.1 Define picture signal.
- 2.2 Describe the properties of Picture signal.
- 2.3 Define Picture element, Gross structure, Fine structure, Image continuity and tonal gradation.
- 2.4 Describe the elementary idea of the role of TV camera, TV transmitter, propagation of signal, reception through antenna, TV receiver for TV communication.
- 2.5 Describe the CCTV, MATV, CATV and satellite TV communication with applications.
- 2.6 Describe the factors affecting range of TV coverage such as line of sight propagation, earth's curvature, antenna heights and power of transmitter.

3. Understand the factors of TV system.

- 3.1 Define Picture scanning.
- 3.2 Describe scanning lines and scanning methods.
- 3.3 Define field, frame, persistence of vision, flicker, picture element, aspect ratio, interlace error.
- 3.4 Mention the Standard of CCIR, CCIR-B, & FCC in Television system.
- 3.5 Mention the frequency range, sound and picture carrier of various bands and channels in the VHF & UHF range used in Bangladesh.

4. Understand the features of TV Camera.

- 4.1 State the principle of photoelectric conversion through camera tube.
- 4.2 Classify TV Camera.
- 4.3 Draw the basic Block Diagram of a TV Camera.
- 4.4 Explain the principle of operation of Videcon, Plumbicon, Silicon diode Array Videcon, SATicon, CCD camera tubes.
- 4.5 Describe the construction of Videcon, Plumbicon, Silicon diode Array Videcon, SATicon, CCD camera tubes.
- 4.6 Explain gamma and gamma correction.
- 4.7 Define image lag, sensitivity and dark current of a camera tube.

5. Understand the Features of Composite Video Signal (CVS).

- 5.1 Define Composite Video Signal.
- 5.2 Formation of composite video signal.
- 5.3 Explain the need for sync, blanking and equalizing pulses.
- 5.4 Describe the need for VSB transmission in television broadcasting.
- 5.5 State the reason for employing AM for vision and FM for sound.
- 5.6 Mention the reason for using negative modulation for TV transmission.

6. Understand the features of Colour Composite Video Signal (CCVS).

- 6.1 Define Three Colour Systems.
- 6.2 Define Hue, Saturation & Brightness of RGB.
- 6.3 Describe Colour Difference Signal.
- 6.4 Describe Luminance & Chrominance Signals.
- 6.5 Define Colour Triangle & Chromaticity Diagram.
- 6.6 Describe the formation of Colour Composite Video Signal.
- 6.7 Describe the compatibility factors in B&W and Colour Transmission.

7. Understand the features of TV Transmitter.

- 7.1 Draw the block diagram of a standard TV transmitter.
- 7.2 Level the signals at input and output of each block.
- 7.3 Describe the functions of each block.
- 7.4 State standard TV Channels Characteristics & TV Transmission Standards.
- 7.5 Describe TV Transmitter Power.

8. Understand the features of Monochrome & Colour TV Receiver & Picture Tube.

- 8.1 Draw the block diagram of a black and white (B&W) TV receiver.
- 8.2 Describe the functions of each block.
- 8.3 Draw the block diagram of a colour TV receiver.
- 8.4 Describe the functions of each block.
- 8.5 Describe the construction & working principle of a B & W picture tube
- 8.6 Describe the basic idea of LCD, LED & Plasma picture tube.
- 8.7 Describe the construction & working principle of different type of colour picture tube.
- 8.8 Describe the Electrostatic & electromagnetic Beam defection system.
- 8.9 Differentiate between camera tube and picture tube.

9. Understand the circuit diagram of TV (IC/ Transistor/Hybrid Models) Receiver.

- 9.1 Describe the Function of Electronic Tuner.
- 9.2 Draw the Block Diagram of a RF Tuner (VHF & UHF).
- 9.3 Describe the operation of Video IF & Video Amplifier.
- 9.4 Describe the operation of Sound IF, FM detector & Keyed AGC Circuit.

- 9.5 Describe the operation of Vertical & Horizontal Deflection Circuit.
- 9.6 Describe the operation of Fly back Transformer & Generation of EHT Voltage.
- 9.7 Describe the operation of AFPC, Colour killer, SC oscillator, CBA, Burst blanking, colour matrix colour difference amplifier.
- 9.8 Describe typical faults in TV receiver circuit.

10. Understand the features of TV Transmitting & Receiving antenna and Booster.

- 10.1 State different types of TV Transmitting antenna.
- 10.2 Mention the procedure of installation of TV Transmitting antenna.
- 10.3 Mention the different types of TV Receiving antenna.
- 10.4 Describe the procedure of installation of Yagi antenna.
- 10.5 Explain the operation of Booster antenna.

11. Understand test equipment and test charts.

- 11.1 Mention the alignment and servicing equipment of television.
- 11.2 Describe the standard test charts and their interpretation & use.
- 11.3 Describe the use of B & W test pattern generators for receiver test and alignment.
- 11.4 Describe signal injectors and their uses for fault finding.
- 11.5 Explain typical fault charts.
- 11.6 Describe trouble shooting procedure of TV receiver.
- 11.7 Mention the safety precautions in television servicing.

12. Understand Digital TV System.

- 12.1 Define Digitization Principle.
- 12.2 Define Pixel array, Scanning notation, Viewing distance & angle, Aspect ratio, Frame rate and Refresh rate.
- 12.3 Describe Raster Scanning & Scan line waveform in DVB system.
- 12.4 Describe Digital Video & Audio signals.
- 12.5 Illustrate MAC signal, D_2 -MAC/ packet signal, MAC decoding & interfacing
- 12.6 Advantages of MAC signal.

PRACTICAL:

1. Identify with physical layout, location of stages and major components of a Black and White & colour TV receiver.

- 1.1 Select a TV receiver and required tools & materials.
- 1.2 Open the TV cover and Dislock mother board circuit from body.
- 1.3 Trace the physical layout.
- 1.4 Identify the location of stages and associate components number.
- 1.5 Identify the location of major components in the physical circuit.
- 1.6 Re-assemble the TV Receiver in previous condition.
- 2. Locate all controls and effect of adjustments of controls on the performance of TV receiver.
 - 2.1 Select a TV receiver and required tools & materials.
 - 2.2 Open the TV cover and Dislock mother board circuit from body.
 - 2.3 Find the location of different control knobs.
 - 2.4 Switch on the power Knob.
 - 2.5 Adjust each control knob.

- 2.6 Monitor the effect on Sound & Picture of TV receiver.
- 2.7 Adjust the controls for best performance.
- 2.8 Re-assemble the TV Receiver in previous condition.

3. Test the power supply stage with typical fault conditions.

- 3.1 Select a TV receiver with required tools and materials.
- 3.2 Identify the power supply stage.
- 3.3 Measure voltages at test points.
- 3.4 Create some faults.
- 3.5 Monitor the effect.
- 3.6 Remove the fault and monitor the operation.

4. Reassemble CRT and allied parts of a TV receiver.

- 4.1 Select a TV receiver with tools and equipment.
- 4.2 Open the TV cover and Dislock mother board circuit from body.
- 4.3 Identify the mechanism of mounting CRT.
- 4.4 Identify the mechanism of CRT Drive system.
- 4.5 Dismount magnets, Deflection coils, earth straps and High voltage connection of CRT.
- 4.6 Re-assemble the parts again.
- 4.7 Adjust the Magnets and Deflection coils for best performance.
- 4.8 Re-assemble the TV Receiver in previous condition.

5. Test the TV CRT and associated circuits.

- 5.1 Select the TV receiver with required tools and materials.
- 5.2 Open the TV cover and Dislock mother board circuit from body.
- 5.3 Check continuity of filament and Deflection coils of CRT,
- 5.4 Switch on the power supply.
- 5.5 Measure the CRT pin voltages.
- 5.6 identify the fault and make remedy.
- 5.7 Re-assemble the TV Receiver in previous condition.

6. Test the tuner stage with typical fault conditions.

- 6.1 Select a TV receiver and required tools & materials.
- 6.2 Open the TV cover and unlock mother board circuit from body.
- 6.3 Switch on the power supply.
- 6.4 Identify the condition of Video and Audio quality.
- 6.5 Change tuner adjustment.
- 6.6 Monitor the performance.
- 6.7 Measure the tuner operating voltages.
- 6.8 Adjust the tuner for best operation.
- 6.9 Re-assemble the TV Receiver in previous condition.

7. Test the horizontal sweep circuit with common faults.

- 7.1 Select a TV receiver with required tools and materials.
- 7.2 Open the TV cover and unlock mother board circuit from body.
- 7.3 Switch on the power supply.
- 7.4 Monitor the picture quality.
- 7.5 Make some common faults in Horizontal oscillator or horizontal sweep circuit and monitor the effect.
- 7.6 Remove the fault for normal operation and monitor the raster/picture on the screen.

7.7 Re-assemble the TV Receiver in previous condition

8. Test the vertical Deflection with common faults.

- 8.1 Select a TV receiver with required tools and materials.
- 8.2 Open the TV cover and unlock mother board circuit from body.
- 8.3 Switch on the power supply.
- 8.4 Make some common fault in Vertical oscillator or Vertical deflection circuit and monitor the effect.
- 8.5 Monitor the performance of vertical Deflection circuit.
- 8.6 Remove the faults and monitor the raster/picture on the screen.
- 8.7 Re-assemble the TV Receiver in previous condition.

9. Test the EHT and other high voltage section of a TV receiver.

- 9.1 Select a TV receiver with required materials and equipment.
- 9.2 Open the TV cover and unlock mother board circuit from body.
- 9.3 Switch on the power supply.
- 9.4 Measure the presence of high voltage.
- 9.5 Identify the associated circuits for high voltage.
- 9.6 Create common fault and monitor the raster on TV screen.
- 9.7 Remove the faults.
- 9.8 Re-assemble the TV Receiver in previous condition.

10. Test the vision IF and detector stage with common faults.

- 10.1 Select a TV receiver with required tools and materials.
- 10.2 Open the TV cover and unlock mother board circuit from body.
- 10.3 Trace the connection of the circuit.
- 10.4 Switch on the power supply.
- 10.5 Monitor the input and output wave shapes.
- 10.6 Create some fault in the circuit.
- 10.7 Monitor the effects.
- 10.8 Remove the faults and monitor the result.
- 10.9 Re-assemble the TV Receiver in previous condition.

11. Test the IFPC stage with common faults.

- 11.1 Select a TV receiver with required tools and materials.
- 11.2 Open the TV cover and unlock mother board circuit from body.
- 11.3 Identify the IFPC stage.
- 11.4 Switch on the power supply.
- 11.5 Monitor input and output wave shapes.
- 11.6 Create some faults in the stage and monitor the effect.
- 11.7 Remove the fault.
- 11.8 Re-assemble the TV Receiver in previous condition.

12. Test the sound stage with typical fault conditions.

- 12.1 Select TV receiver with required materials and tools.
- 12.2 Open the TV cover and unlock mother board circuit from body.
- 12.3 Identify the sound stage.
- 12.4 Switch on the power supply.
- 12.5 Measure sound and wave shapes at test point.
- 12.6 Create some faults in the circuit and listen the effect.

- 12.7 Remove the fault.
- 12.8 Re-assemble the TV Receiver in previous condition.

13. Test the video amplifier stage with typical fault conditions.

- 13.1 Select a TV receiver with required tools and materials.
- 13.2 Open the TV cover and unlock mother board circuit from body.
- 13.3 Identify the video amplifier stage.
- 13.4 Switch on the power supply.
- 13.5 Monitor the wave shapes at test points.
- 13.6 Create some faults and monitor the effect.
- 13.7 Remove the fault.
- 13.8 Re-assemble the TV Receiver in previous condition.
- 14. 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
- 3. Digital Television: Technology and Standar Jhon F. Arnold
- 4. Television and Video Engineer A M Dhake, MGH
- 5. elevision Engineering and Video System R G Gupta, MGH

66852 Electronic Measuring Instruments T P C

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OBJECTIVES

Upon completion of these contents student will be able to achieve and acquire knowledge, skills and attitude in the area of Electronic Measuring Instrument special emphasis on:

- Classification of Measuring Instrument
- Indicating, Recording & Integrating Instruments
- Electronic Instruments.
- Digital Instruments.
- Special type meters.

SHORT DESCRIPTION

Measuring Instrument & its classification; Indicating instruments, Moving coil & moving iron type indicating instrument, Ammeter, Voltmeter & Multimeter; recording and integrating; Electronic Instrument; Digital instruments; Oscilloscope, LCR meter, Q-meter, Frequency meter, Distortion meter, Power factor meter, RX meter, psopho meter & microwave power meter.

DETAIL DESCRIPTION

Theory:

1. Understand measuring instruments and its classification.

- 1.1 State measuring instrument.
- 1.2 Mention different types of measuring instruments.
- 1.3 Describe absolute and secondary instruments.
- 1.4 List different types of secondary instruments.

2. Understand indicating instruments.

- 2.1 State principle of indicating instrument.
- 2.2 Define torque.
- 2.3 Describe the basic construction of Indicating instrument
- 2.4 State the torque weight ratio
- 2.5 Describe deflecting, controlling and damping torque.
- 2.6 Describe spring control and gravity control.
- 2.7 State different types of damping.
- 2.8 Solve problems related to spring control and gravity control system.

3. Understand the moving coil & moving iron instruments.

- 3.1 Describe the construction and working principle of permanent magnet moving coil instruments.
- 3.2 Explain the torque equation of the moving coil instrument.
- 3.3 Mention the advantages and disadvantages of permanent magnet moving coil instruments.
- 3.4 Describe the construction and working principle of moving iron instruments.
- 3.5 Explain the torque equation of moving iron type instruments.
- 3.6 Mention the advantages and disadvantages of moving iron instruments

4. Understand the operation of ammeters, voltmeters & analog Multimeter.

- 4.1 Describe the principle of operation of ammeter and voltmeter.
- 4.2 Distinguish between ammeter and voltmeter.
- 4.3 List various types of ammeter and voltmeter.
- 4.4 State the uses of multimeter.
- 4.5 Describe the block diagram of an analog multimeter.

5. Understand the recording and integrating instruments.

- 5.1 State principle of recording instrument.
- 5.2 State principle of integrating instrument.
- 5.3 Explain the basic constructional diagram of Energy meter.
- 5.4 Describe the construction & working principle of maximum demand indicator.

6. Understand the Electronic Instruments

- 6.1 State principle of electronic instrument.
- 6.2 Classify electronic instrument.
- 6.3 Describe the block diagram of Electronic VOM.
- 6.4 Advantages of electronic instruments.

7. Understand digital Instruments.

- 7.1 Explain the principle of operation of digital instruments.
- 7.2 Describe the advantages of digital instruments.
- 7.3 Describe the operation of transistor voltmeter (TVM).
- 7.4 Describe the operation of ramp type digital voltmeter (DVM).
- 7.5 Describe the operation of successive approximation digital voltmeter.
- 7.6 Describe the block diagram of digital multimeter.

8. Understand the principle and operation of oscilloscope.

- 8.1 State the basic principle of oscilloscope.
- 8.2 Mention the types of oscilloscope.
- 8.3 Mention the important features of cathode ray oscilloscope
- 8.4 Describe the block diagram of oscilloscope.
- 8.5 Describe the operation of dual trace oscilloscope.
- 8.6 Describe the operation of digital oscilloscope.

9. Understand LCR & Q- meter.

- 9.1 State the Principle of LCR meter.
- 9.2 Draw the block diagram of LCR meter.
- 9.3 Describe the operation of LCR meter.
- 9.4 State the Principle of Q- meter.
- 9.5 Draw the block diagram of Q- meter.
- 9.6 Describe the operation of Q- meter.

10. Understand Frequency meter & Distortion meter.

- 10.1 State the Principle of Frequency meter.
- 10.2 Draw the block diagram of Frequency meter.
- 10.3 Describe the operation of Frequency meter
- 10.4 State the Principle of Distortion factor meter.
- 10.5 Draw the block diagram of Distortion factor meter.
- 10.6 Describe the operation of Distortion factor meter.

11. Understand Power factor meter & Magger.

- 11.1 State the Principle of *Power factor* meter.
- 11.2 Draw the block diagram of Power factor meter.
- 11.3 Describe the operation of Power factor meter.
- 11.4 State the Principle of *Magger*.
- 11.5 Draw the block diagram of *Magger*.
- 11.6 Describe the operation of *Magger*.

12. Understand RX meter, psopho meter & microwave power meter.

- 12.1 State the Principle of *RX* meter.
- 12.2 Draw the block diagram of *RX* meter.
- 12.3 Describe the operation of *RX* meter.
- 12.4 State the Principle of *Psopho* meter.
- 12.5 Draw the block diagram of *Psopho* meter.
- 12.6 Describe the operation of *Psopho* meter.
- 12.7 State the Principle of *Microwave power* meter.
- 12.8 Draw the block diagram of *Microwave power* meter.
- 12.9 Describe the operation of *Microwave power* meter.

PRACTICAL:

1. Study of measuring instruments.

- 1.1 Select at least eight different measuring instruments.
- 1.2 Identify the types of given instruments.
- 1.3 Detect the ranges of instruments.
- 1.4 Identify the control knobs, terminals, ports & other features.

2. Perform the operation of indicating instruments.

- 2.1 Select an indicating instrument (Galvanometer).
- 2.2 Select the necessary tools required.
- 2.3 Open the meter cover and Dislock circuit from body.
- 2.4 Identify moving coil, graduation scale plate, deflecting niddle, circuit and battery case.
- 2.5 Monitor the operation of moving system.
- 2.6 Disassemble the moving iron parts, controlling and damping section of a moving iron instrument.
- 2.7 Check the balancing system of the moving parts.
- 2.8 Assemble the parts as original of both instruments.

3. Perform the operation of ammeter (AC & DC).

- 3.1 Select ammeters.
- 3.2 Select the necessary tools required.
- 3.3 Open the cover of ammeter.
- 3.4 Disassemble the parts of the meter.
- 3.5 Identify the parts of the meter.
- 3.6 Identify the shunt resistances used for meter range.
- 3.7 Identify the types of meter (AC or DC).
- 3.8 Assemble the parts as original of both instruments.

4. Study of voltmeter (AC & DC).

- 4.1 Select voltmeters.
- 4.2 Select the necessary tools required.
- 4.3 Open the cover of voltmeter.
- 4.4 Disassemble the parts of the voltmeter.
- 4.5 Identify the parts of the meter.
- 4.6 Identify the multiplier resistances used for meter range.
- 4.7 Identify the types of meter (AC or DC).
- 4.8 Assemble the parts as original of both instruments.

5. Perform the operation of analog multimeter.

- 5.1 Select the multimeter.
- 5.2 Select the necessary tools required.
- 5.3 Open the cover of multimeter.
- 5.4 Disassemble the parts of the multimeter.
- 5.5 Identify the parts of the meter.
- 5.6 Identify the different sections of multimeter.
- 5.7 Assemble the parts as original multimeter.

6. Study of Energy meter.

- 6.1 Select a single phase energy meter.
- 6.2 Select the necessary tools required.
- 6.3 Open the cover of energy meter.
- 6.4 Disassemble the parts of the energy meter.
- 6.5 Identify the parts of the meter.
- 6.6 Identify the different sections of energy meter.
- 6.7 Assemble the parts as original of energy meter.

7. Study of electronic VOM.

- 7.1 Select an electronic VOM.
- 7.2 Select the necessary tools required.
- 7.3 Open the cover of electronic VOM.
- 7.4 Disassemble the parts of the VOM.
- 7.5 Identify the parts of VOM.
- 7.6 Identify the different sections of electronic VOM.
- 7.7 Assemble the parts as original VOM meter.

8. Study of digital multimeter.

- 8.1 Select a digital multimeter.
- 8.2 Select the necessary tools required.
- 8.3 Open the cover of digital multimeter.
- 8.4 Disassemble the parts of the digital multimeter.
- 8.5 Identify the parts of the meter.
- 8.6 Identify the different sections of digital multimeter.
- 8.7 Assemble the parts as original digital multimeter.

9. Study of digital multimeter.

- 9.1 Select a digital multimeter.
- 9.2 Select the necessary tools required.

- 9.3 Open the cover of digital multimeter.
- 9.4 Disassemble the parts of the digital multimeter.
- 9.5 Identify the parts of the meter.
- 9.6 Identify the different sections of digital multimeter.
- 9.7 Assemble the parts as original digital multimeter.

10. Study of Cathode Ray Oscilloscope.

- 10.1 Select a cathode ray oscilloscope.
- 10.2 Identify the beam control system.
- 10.3 Connect the signal probe to oscilloscope input.
- 10.4 Switch on the power supply of CRO.
- 10.5 Operate the position control knobs and monitor the HDL on oscillograph.
- 10.6 Select Volt/div. knob and monitor its operation.
- 10.7 Select Time/div. knob and monitor its operation.
- 10.8 Monitor the position of deflection beam in X-Y operation.

11. Study of Power factor meter & Magger.

- 11.1 Select a power factor meter.
- 11.2 Select the necessary tools required.
- 11.3 Open the cover of power factor meter.
- 11.4 Identify the parts of the meter.
- 11.5 Select a magger.
- 11.6 Open the cover of magger.
- 11.7 Identify the parts of the magger.
- 11.8 Assemble the power factor meter & magger.

12. Study of Distortion meter & microwave power meter.

- 12.1 Select a Distortion meter.
- 12.2 Select the necessary tools required.
- 12.3 Open the cover of distortion meter.
- 12.4 Identify the parts of the meter.
- 12.5 Identify the controlling knobs of distortion meter.
- 12.6 Select a microwave power meter.
- 12.7 Identify the controlling knobs of the meter.
- 12.8 Monitor the result of changing position of controlling knobs.

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

66853 Advanced Communication Engineering T P C

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OBJECTIVES

Upon completion of these contents student will be able to achieve and acquire knowledge, skills and attitude in the area of Advanced Communication Engineering special emphasis on:

- Switching systems.
- Communication system
- Networking devices
- Mobile communication
- Wi-Fi, Wi-Max.

SHORT DESCRIPTION

Switching systems, DSL, ADSL; Optical fiber communication, light source & Detector for optical fiber communication system; Satellite communication, special purpose communication satellite; Network and network switching device; SONET, ATM ,ISDN; Interface standard, Network & networking devices; mobile communication & cellular system; Bluetooth, Wi-Fi.

DETAIL DESCRIPTION

Theory:

- 1. Understand Switching System.
 - 1.1 Mention the elements of switching system.
 - 1.2 State the classification of switching system.
 - 1.3 Describe centralized and distributed SPC switching system.
 - 1.4 Explain the technique of circuit switching, message switching and packet switching.
 - 1.5 Mention the advantages and disadvantages of different types of switching.

2. Understand Digital Switching System.

- 2.1 State digital switching.
- 2.2 Describe the digital signal encoding.
- 2.3 Describe space division switching.
- 2.4 Describe analog time division and digital time division switching.
- 2.5 Describe STS & TST switching.

3. Understand Digital Subscriber Line (DSL) Technology

- 3.1 State DSL & ADSL.
- 3.2 State the principle of DSL
- 3.3 Discuss encoding and modulation in DSL.
- 3.4 Mention the frequency spectrum of ADSL.
- 3.5 Describe the topology & frame format for DSL system
- 3.6 Describe the topology & frame format for ADSL system
- 3.7 Mention the advantage and disadvantage of DSL & ADSL

4. Understand the optical fiber communications.

- 4.1 Define optic fiber.
- 4.2 Describe the basic construction of an optic fiber.
- 4.3 Discuss type of optic fiber.
- 4.4 Describe the block diagram of an optical fiber communication system.

- 4.5 Explain propagation of light waves in optical fiber.
- 4.6 State acceptance angle and numerical aperture of a fiber.
- 4.7 Mention the advantages and disadvantages of optic fibers.

5. Understand the light sources and detector for optical fiber.

- 5.1 Describe the structure of LED.
- 5.2 Explain the method of fiber LED coupling.
- 5.3 Describe the laser operation.
- 5.4 Describe the structure of semiconductor laser diode.
- 5.5 Mention the advantages of semiconductor laser diode.
- 5.6 Describe the basic principle of photo detectors.
- 5.7 State the characteristics of photo detector.

6. Understand optical fiber joints, couplers and isolators.

- 6.1 List the possible misalignment occur during fiber joints
- 6.2 Mention the constraint for joining fibers.
- 6.3 Define fiber splice.
- 6.4 Describe different fiber splices.
- 6.5 List different type of fiber connectors.
- 6.6 Describe fiber couplers.
- 6.7 Describe optical Isolators and circulators

7. Understand the satellite communication system.

- 7.1 Define satellite.
- 7.2 Describe the satellite orbits.
- 7.3 State the classification of satellite.
- 7.4 Describe the satellite earth station with block diagram.
- 7.5 State the footprint & location of satellite.
- 7.6 Describe the block diagram of Transponder.
- 7.7 Discuss the tracking and ranging system of communication satellites.
- 7.8 Describe the components of satellite electric power system.

8. Understand the special purpose communication satellite.

- 8.1 Describe the very small terminals (VSATs).
- 8.2 Describe the function of international telecommunication satellite (INTERSAT).
- 8.3 Describe mobile satellite (MSAT) communication system.
- 8.4 Explain the Global positioning system (GPS).
- 8.5 Describe the block diagram of a handheld GPS receiver.
- 8.6 Compare the satellite communication with respect to fiber optic communication.
- 8.7 Mention the applications of satellite.

9. Understand the data communication network and switching device.

- 9.1 Define the term network.
- 9.2 State the types of network.
- 9.3 Describe Network Addressing.
- 9.4 Describe the network topologies.
- 9.5 State the various types of protocols.
- 9.6 Explain the term Token passing and VOIP.
- 9.7 Describe MODEM & function of MODEM.
- 9.8 Describe the function of Hubs.

10. Understand Synchronous Optical Network (SONET) & Synchronous Digital Hierarchy (SDH).

10.1 Define SONET & SDH

- 10.2 Mention the characteristics of SONET & SDH.
- 10.3 State SONET Signal Hierarchy.
- 10.4 Mention SONET components.
- 10.5 Describe SONET Network and Layers.
- 10.6 Recognize the SONET Frame Format.
- 10.7 Describe SONET Multiplexing.
- 10.8 Explain SONET Topologies.

11. Understand asynchronous & synchronous data transmission.

- 11.1 Define synchronous and asynchronous transmission.
- 11.2 Mention the advantages and disadvantages of digital transmission.
- 11.3 Define ATM technology.
- 11.4 State the concepts of ATM.
- 11.5 Mention the Advantages of ATM.
- 11.6 State ATM Header Structure.
- 11.7 Describe ATM Layers.

12. Understand the Integrated Services Digital Network (ISDN).

- 12.1 Define ISDN.
- 12.2 Mention the ISDN services.
- 12.3 Mention the advantages of ISDN.
- 12.4 Describe the ISDN interfaces.
- 12.5 Describe the ISDN channels.
- 12.6 Describe the ISDN switching, functional grouping and reference points.

13. Understand Mobile communication.

- 13.1 State mobile communication.
- 13.2 Describe Cellular telephone system.
- 13.3 Describe the basic composition of mobile communication system.
- 13.4 Explain Cellular telephone system.
- 13.5 Describe cell splitting, frequency reuse, roaming, and handoff in cellular telephone.
- 13.6 Mention the channels and bands of different Cellular telephone system.
- 13.7 Describe the subscriber identification techniques.

14.Understand GSM network.

- 14.1 Define GSM.
- 14.2 Describe the architecture of GSM.
- 14.3 Describe the typical call flow sequence in GSM.
- 14.4 State the basic principle of CDMA.
- 14.5 Mention the CDMA frequency and channel allocations.
- 14.6 Describe Short Message Management Protocol.
- 14.7 Describe the block diagram of a mobile phone hand set.
- 14.8 State characteristics of smart phone
- 14.9 Describe Bluetooth, Wi-MAX , Wi-Fi & WAP.

15. Understand Network & Submarine cable.

15.1 Define STP & UTP cables.

- 15.2 State the characteristics of STP & UTP cables.
- 15.3 Define submarine cable.
- 15.4 Describe the construction of submarine cable.
- 15.5 Classify submarine cable.
- 15.6 Advantages of submarine cable for DATA communication.

PRACTICAL:

1. Study of fiber optic cable.

- 1.1 Collect a Piece of fiber optic cable.
- 1.2 Find different section of fiber optic cable.
- 1.3 Find the layers of optical fiber.
- 1.4 Draw different section of fiber optic cable

2. Study of optical fiber.

- 2.1 Collect Fiber Optic Trainer.
- 2.2 Connect optic fiber with source & detector.
- 2.3 Switch on the Fiber Optic Trainer.
- 2.4 Monitor the signal transmission (Light Beam) through fiber.

3. Study the characteristics of optical fiber.

- 3.1 Collect Fiber Optic Trainer.
- 3.2 Connect optic fiber with source & detector.
- 3.3 Switch on the Fiber Optic Trainer.
- 3.4 Calculate numerical aperture of optical fiber.
- 3.5 Calculate critical angle of optical fiber.

4. Study of optical fiber joint.

- 4.1 Collect two pieces of optic fiber.
- 4.2 Collect Splices machine.
- 4.3 Insert the optic fibers to the splices machine.
- 4.4 Make joint.
- 4.5 Test the continuity of joint fiber.

5. Test the operation of Hub & Router.

- 5.1 Collect Hub & Router.
- 5.2 Connect Hub & Router with Network.
- 5.3 Configure PC with Hub & Router.
- 5.4 Monitoring signal.

6. Study of UTP & STP cables and connectors.

- 6.1 Collect required tools, tester & materials.
- 6.2 Identify colour & colour selection for desire connection.
- 6.3 Make sure the matching of connector pins with respective color of cables.
- 6.4 Prepare the connection.
- 6.5 Test the connection.

7. Perform connection between UTP cable & RJ 45 connectors.

- 7.1 Collect required tools, tester & materials.
- 7.2 Prepare the cable for straight through connection.
- 7.3 Make the connection.
- 7.4 Prepare the cable for cross over connection
- 7.5 Make the connection
- 7.6 Test the connections.

8. Set up a LAN.

- 8.1 Collect Server & PC, Hub, UTP cables & connectors,
- 8.2 Collect Tools & Cable tester.
- 8.3 Collect network operating system software.
- 8.4 Connect hardware's.

- 8.5 Install necessary software.
- 8.6 Configure Server & PC
- 8.7 Test the functioning of networking

9. Perform DSL connection.

- 9.1 Collect necessary tools & equipments.
- 9.2 Make connection between existing LAN or desired PC with DSL/ADSL modem.
- 9.3 Configure the connections.
- 9.4 Test the connection.
- 9.5 Monitor the operation.

10. Study cellular communication.

- 10.1 Collect Cellular communication trainer,
- 10.2 Collect Tools & accessories.
- 10.3 Insert SIMs into the trainer.
- 10.4 Complete connections.
- 10.5 Dial recepant SIM number.
- 10.6 Listen ring tone to the receiver end.
- 10.7 Start conversation.
- 10.8 Close the connection.

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.

66854 Advanced Digital Electronics

T P C 3 3 4

OBJECTIVES

Upon completion of this content student will be able to achieve and acquire knowledge, skills and attitude in the area of Advanced Digital Electronics special emphasis on:

- Timers, counters & shift registers and their applications.
- Semiconductor memories.
- ALU & CU.
- A/D and D/A converters.
- Programmable logic arrays and programmable array logic
- PLD & simple computer (SAP-1 & SAP-2)

SHORT DESCRIPTION

Digital timers, counters & shift registers: Semiconductor memory & Memory organization, memory Read/Write Operation: ALU & CU: A/D & D/A Conversion system: PLA & PAL system: PLD operations, SAP-1 & SAP-2.

DETAIL DESCRIPTION

Theory:

1. Understand Timer, Registers and their application.

- 1.1 Define timer & clock generator.
- 1.2 Describe the operation of 555 timer circuit.
- 1.3 Define data shift register.
- 1.4 Mention different types of shift registers.
- 1.5 List the different types of common shift register IC chips.
- 1.6 Describe the operation of buffer register.
- 1.7 Explain the basic principle of operation of SISO, SIPO, PISO & PIPO shift register.
- 1.8 Describe the operation of shift left, shift right and universal shift registers.
- 1.9 Mention the use of shift registers.

2. Understand Counters and their application.

- 2.1 Define binary counter.
- 2.2 State the difference between asynchronous and synchronous operation.
- 2.3 Describe the operation of a binary up down counter.
- 2.4 State the modulus of a counter.
- 2.5 Describe the principle of MOD counter & divide by- n counter.
- 2.6 Describe the operation of decade counter.
- 2.7 State the principle of ring & Johnson counter.
- 2.8 State the application of different types of counters.
- 2.9 Describe the operation of digital clock.

3. Understand semiconductor memories.

- 3.1 List the type of memories.
- 3.2 Describe the principle of serial and parallel access memory.
- 3.3 Explain the internal organization of semiconductor memory.
- 3.4 Describe the technique of memory addressing.
- 3.5 Explain the read and write operation of semiconductor memory.

- 3.6 Explain the principle of operation of static and dynamic RAM.
- 3.7 Describe the principle and operation of ROM, PROM, EPROM and EEPROM.
- 3.8 List the application of some commercial memory ICs.

4. Understand arithmetic logic circuit.

- 4.1 Mention the basic principle of ALU.
- 4.2 List the application of ALU.
- 4.3 Identify some commercial ALU chips.
- 4.4 Mention the principle of digital comparators.
- 4.5 Mention the principle of binary rate multiplier with block diagram.
- 4.6 List the application of digital comparators.
- 4.7 Identify some commercial comparators and binary rate multiplier ICS.

5. Understand D/A converter.

- 5.1 Mention the principle of level conversion.
- 5.2 Describe the principle of D/A conversion.
- 5.3 Mention the types of D/A converter.
- 5.4 Explain the operation of a binary weighted D/A and R-2R ladder D/A converter.
- 5.5 State the terms resolution, percentage of resolution, accuracy, Offset error and settling time as specification of D/A converter.
- 5.6 State the application field of D/A converter.
- 5.7 List the application of popular D/A converter ICS.

6. Understand A/D converter.

- 6.1 State the principle of A/D conversion.
- 6.2 List the type of A/D converter.
- 6.3 State the working principle of 3-bit parallel A/D converter.
- 6.4 Describe the operation of Digital Ramp A/D converter
- 6.5 Explain the principle of operation of successive approximation, dual slope and Flash A/D converter.
- 6.6 State the terms resolution, accuracy, and conversion time as specification of A/D converter.
- 6.7 List the applications of popular A/D converter ICS.
- 6.8 Describe the operation of sample & hold circuits and its application.

7. Understand the programmable logic arrays.

- 8.1 Define logic array.
- 8.2 State the principle of AND array & OR array.
- 8.3 Calculate Boolean calculation of Logic arrays.
- 8.4 Define PLA, PAL and GAL
- 8.5 Discuss simplified logic diagram of PLA, PAL and GAL.
- 8.6 Describe the architecture of two input PLA, PAL and GAL.
- 8.7 State the basic feature of FPGA.

8. Understand the programmable logic devices.

- 9.1 Defines PLD.
- 9.2 State the advantages of PLD.
- 9.3 Describe the principle of PLD.
- 9.4 Describe the programming process of SPDL
- 9.5 Describe the complex programmable logic device (CPDL).
- 9.6 Interpret standard PAL and GAL numbering.

9. Understand the organization of a SAP-1

- 10.1 State the meaning of SAP.
- 10.2 State the function of each stage of SAP-1 with block diagram.
- 10.3 State the function of control signals i.e. Enable, Load, Clock and Clear of each register IC.

- 10.4 State the instruction for accessing and storing data in RAM of SAP-1.
- 10.5 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 of SAP-1.
- 10.6 Describe the execution steps of micro instruction in different T states of SAP-1.

11. Understand the Organization & Instruction of SAP-2

- 11.1 State the function of each stage of SAP-2 with block diagram.
- 11.2 State the instruction for accessing and storing data in RAM of SAP-2.
- 11.3 State the meaning of macro instructions and their corresponding binary op-code used in SAP-2.
- 11.4 Describe the fetching steps of micro instruction in different T states of SAP-2.
- 11.5 Describe the execution steps of micro instruction in different T states of SAP-2.

PRACTICAL:

1. Verify the operation of Timer & Shift register.

- 1.1 Select 555 timer IC.
- 1.2 Connect 555 timers as a clock generator.
- 1.3 Observe the wave form in oscilloscope.
- 1.4 Select a SIPO shift register IC.
- 1.5 Connect the SIPO shift register circuits on Digital Trainer Board.
- 1.6 Apply clock input pulse to the circuit and observe the operation.
- 1.7 Select a PISO shift register IC.
- 1.8 Connect the PISO shift register circuits on Digital Trainer Board.
- 1.9 Apply clock input pulse to the circuit and observe the operation.

2. Verify the operation of Binary counter.

- 2.1 Select 4-Bit ripple counter IC.
- 2.2 Connect the Up/Down ripple counter circuit on Digital Trainer Board
- 2.3 Apply clock input pulse to the circuit and observe the operation of up-counting and down counting.
- 2.4 Select MOD-10 counter IC.
- 2.5 Connect the Decade counter circuit on Digital Trainer Board
- 2.6 Apply clock input pulse to the circuit and observe the Decade operation.

3. Verify the operation of SRAM.

- 3.1 Select a SRAM IC.
- 3.2 Connect Static RAM circuit on Digital Trainer Board.
- 3.3 Apply input data and clock pulse to the circuit.
- 3.4 Observe the operation of the circuit and stored memory data in to the SRAM.

4. Verify the operation of DRAM.

- 4.1 Select a DRAM IC.
- 4.2 Connect Dynamic RAM circuit on Digital Trainer Board.
- 4.3 Apply input data and clock pulse to the circuit.

4.4 Observe the operation of the circuit and stored memory data in to the DRAM.

5. Verify the operation of a EPROM .

- 5.1 Select a EPROM IC.
- 5.2 Connect EPROM circuit on Digital Trainer Board.
- 5.3 Apply input data and clock pulse to the circuit.
- 5.4 Observe the operation of the circuit and stored memory data in to the **EPROM**.

6. Verify the operation of an Arithmetic Logic Unit (ALU).

- 6.1 Select a ALU IC.
- 6.2 Connect ALU circuit on Digital Trainer Board.
- 6.3 Apply input data and clock pulses to the different input of the circuit.
- 6.4 Observe the operation of the circuit and detect the output result of ALU.

7. Verify the operation of D/A converter.

- 7.1 Select a D/A converter IC.
- 7.2 Connect a ladder R/2R D/A converter circuit on Digital Trainer Board.
- 7.3 Apply input data and clock pulses to the different input of the circuit.
- 7.4 Obserb the operation of the circuit and detect the output result of D/A converter.

8. Verify the operation of A/D converter.

- 8.1 Select an A/D converter IC.
- 8.2 Connect a 3-bit parallel A/D converter circuit on Digital Trainer Board.
- 8.3 Apply input data and clock pulses to the different input of the circuit.
- 8.4 Observe the operation of the circuit and detect the output result of A/D converter.

9. Show the operation of a dual slope A/D converter.

- 9.1 Select an A/D converter IC.
- 9.2 Connect a dual slope A/D converter circuit on Digital Trainer Board.
- 9.3 Apply input data and clock pulses to the different input of the circuit.
- 9.4 Observe the operation of the circuit and detect the output result of dual slope A/D converter.

10. Show the operation of Programmable Logic Device (PLD).

10.1 Select appropriate PLD IC.

- 10.2 Connect PLD Operational circuit on Digital Trainer Board.
- 10.3 Apply input data and clock pulses to the different input of the circuit.
- 10.4 Observe the operation of the circuit and detect the output result PLD.

11. Show the operation of CPLD.

- 11.1 Select appropriate CPLD IC.
- 11.2 Connect CPLD Operational circuit on Digital Trainer Board.
- 11.3 Apply input data and clock pulses to the different input of the circuit.
- 11.4 Observe the operation of the circuit and detect the output result CPLD.

12. Verify the operation of SAP-1.

- 12.1 Select appropriate SAP-1 IC.
- 12.2 Connect SAP-1 operational circuit on Digital Trainer Board.
- 12.3 Apply input data and clock pulses to the different input of the circuit.
- 12.4 Observe the operation of the circuit and detect the output result of SAP-1.

13. Verify the operation of SAP-2.

13.1 Select appropriate SAP-2 IC.

- 13.2 Connect SAP-2 operational circuit on Digital Trainer Board.
- 13.3 Apply input data and clock pulses to the different input of the circuit.
- 13.4 Observe the operation of the circuit and detect the output result of SAP-2.

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

Electronic Servicing-II 66855

С Т Ρ 3 1

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OBJECTIVES

Upon completion of these content student will be able to achieve and acquire knowledge, skills and attitude in the area of Electronic Servicing-2 special emphasis on:

- Safety precautions and electronics workshop safety regulations.
- Identify the tools, measuring and testing instruments used in servicing.
- Security system.
- Color TV, LCD & LED TV.
- Multimedia projector, Washing machine.
- Video Camera.
- Photo Copier.
- Telephone Set.
- Microcomputer.
- ECG & USG machine.

SHORT DESCRIPTION

Safety and precautions, Identify tools, tester, equipment, Security system, Color TV, LCD & LED TV, Multimedia projector, washing machine, Video Camera, Photo Copier, Digital Telephone Set, Mobile phone set, microcomputer, ECG and USG machine.

DETAIL DESCRIPTION

Practical:

1. Apply safety and precautions.

- 1.1. List the safety precautions.
- 1.2. List the workshop safety regulations.
- 1.3. Learn about Electrical & Electronics equipment safety policy.

2. Identify the tools, tester, equipment and instruments for servicing.

- 2.1. Collect different tools and instruments.
- 2.2. Categories the tools and instruments.
- 2.3. Draw the pictures of required tools & instruments and labeling the major features.
- **2.4.** Operate the required tools and instruments.

3. Perform repairing and maintenance of a security system.

- 3.1. Select necessary tools, tester and instrument.
- 3.2. Examine the physical condition of the system.
- 3.3. Identify the symptoms.
- 3.4. Measure voltage or signals on specified test point.
- 3.5. Identify the faulty components.
- 3.6. Replace the faulty components.
- 3.7. Test the functioning.

4. Perform repairing and maintenance of a colour TV.

- 4.1. Select the proper tools, instruments, equipment and manuals.
- 4.2. Inspect the physical condition of the color TV.

- 4.3. Identify the symptoms and write the possible causes of the symptoms.
- 4.4. Unscrew and remove the cover of the color TV.
- 4.5. Locate the probable faulty sections.
- 4.6. Check or test the possible causes sequentially.
- 4.7. Identify the faulty section/components.
- 4.8. Replace the faulty components.
- 4.9. Test the functioning.

5. Perform repairing and maintenance of a LCD TV.

- 5.1. Select the proper tools, instruments, equipment and manuals.
- 5.2. Inspect the physical condition of the LCD TV.
- 5.3. Identify the symptoms and write the possible causes of the symptoms.
- 5.4. Unscrew and remove the cover of the LCD TV.
- 5.5. Locate the probable faulty sections.
- 5.6. Check or test the possible causes sequentially.
- 5.7. Identify the faulty section/components.
- 5.8. Replace the faulty components.
- 5.9. Test the functioning.

6. Perform repairing and maintenance of a LED TV.

- 6.1. Select the proper tools, instruments, equipment and manuals.
- 6.2. Inspect the physical condition of the LED TV.
- 6.3. Identify the symptoms and write the possible causes of the symptoms.
- 6.4. Unscrew and remove the cover of the LED TV.
- 6.5. Locate the probable faulty sections.
- 6.6. Check or test the possible causes sequentially.
- 6.7. Identify the faulty section/components.
- 6.8. Replace the faulty components.
- 6.9. Test the functioning.

7. Perform repairing and maintenance of a Multimedia Projector.

- 7.1. Select the proper tools, instruments, equipment and manuals.
- 7.2. Inspect the physical condition of the Multimedia Projector.
- 7.3. Identify the symptoms and write the possible causes of the symptoms.
- 7.4. Unscrew and remove the cover of the Multimedia Projector.
- 7.5. Locate the probable faulty sections.
- 7.6. Check or test the possible causes sequentially.
- 7.7. Identify the faulty section/components.
- 7.8. Replace the faulty components.
- 7.9. Test the functioning.

8. Perform repairing and maintenance of a washing machine.

- 8.1. Select the proper tools, instruments, equipment and manuals.
- 8.2. Inspect the physical condition of the washing machine.
- 8.3. Identify the symptoms and write the possible causes of the symptoms.
- 8.4. Unscrew and remove the cover of the washing machine.
- 8.5. Locate the probable faulty sections.
- 8.6. Check or test the possible causes sequentially.
- 8.7. Identify the faulty section/components.

- 8.8. Replace the faulty components.
- 8.9. Test the functioning.

9. Perform repairing and maintenance of a Video Camera.

- 9.1. Select the proper tools, instruments, equipment and manuals.
- 9.2. Inspect the physical condition of the Video Camera.
- 9.3. Identify the symptoms and write the possible causes of the symptoms.
- 9.4. Unscrew and remove the cover of the Video Camera.
- 9.5. Locate the probable faulty sections.
- 9.6. Check or test the possible causes sequentially.
- 9.7. Identify the faulty section/components.
- 9.8. Replace the faulty components.
- 9.9. Test the functioning.

10. Perform repairing and maintenance of a Photo Copier.

- 10.1. Select the proper tools, instruments, equipment and manuals.
- 10.2. Inspect the physical condition of the Photo Copier.
- 10.3. Identify the symptoms and write the possible causes of the symptoms.
- 10.4. Unscrew and remove the cover of the Photo Copier.
- 10.5. Check the drum
- 10.6. Locate the probable faulty sections.
- 10.7. Check or test the possible causes sequentially.
- 10.8. Identify the faulty section/components.
- 10.9. Replace the faulty components.
- 10.10. Test the functioning.

11. Perform repairing and maintenance of a Digital Telephone set.

- 11.1. Select the proper tools, instruments, equipment and manuals.
- 11.2. Inspect the physical condition of the Digital Telephone set.
- 11.3. Identify the symptoms and write the possible causes of the symptoms.
- 11.4. Unscrew and remove the cover of the Digital Telephone set.
- 11.5. Locate the probable faulty sections.
- 11.6. Check or test the possible causes sequentially.
- 11.7. Identify the faulty section/components.
- 11.8. Replace the faulty components.
- 11.9. Test the functioning.

12. Perform repairing and maintenance of a Mobile phone set.

- 12.1. Select the proper tools, instruments, equipment and manuals.
- 12.2. Inspect the physical condition of the Mobile phone set.
- 12.3. Identify the symptoms and write the possible causes of the symptoms.
- 12.4. Unscrew and remove the cover of the Mobile phone set.
- 12.5. Locate the probable faulty sections.
- 12.6. Check or test the possible causes sequentially.
- 12.7. Identify the faulty section/components.
- 12.8. Replace the faulty components.
- 12.9. Test the functioning.

13. Perform repairing and maintenance of a microcomputer.

13.1. Select the proper tools, instruments, equipment and manuals.

- 13.2. Inspect the physical condition of the microcomputer.
- 13.3. Identify the symptoms and write the possible causes of the symptoms.
- 13.4. Unscrew and remove the cover of the microcomputer.
- 13.5. Locate the probable faulty sections.
- 13.6. Check or test the possible causes sequentially.
- 13.7. Identify the faulty section/components.
- 13.8. Replace the faulty components.
- 13.9. Test the functioning.

14. Perform repairing and maintenance of an ECG machine.

- 14.1. Select the proper tools, instruments, equipment and manuals.
- 14.2. Inspect the physical condition of the ECG machine.
- 14.3. Identify the symptoms and write the possible causes of the symptoms.
- 14.4. Unscrew and remove the cover of the ECG machine.
- 14.5. Locate the probable faulty sections.
- 14.6. Check or test the possible causes sequentially.
- 14.7. Identify the faulty section/components.
- 14.8. Replace the faulty components.
- 14.9. Test the functioning.

15. Perform repairing and maintenance of a USG machine.

- 15.1. Select the proper tools, instruments, equipment and manuals.
- 15.2. Inspect the physical condition of the USG machine.
- 15.3. Identify the symptoms and write the possible causes of the symptoms.
- 15.4. Unscrew and remove the cover of the USG machine.
- 15.5. Locate the probable faulty sections.
- 15.6. Check or test the possible causes sequentially.
- 15.7. Identify the faulty section/components.
- 15.8. Replace the faulty components.
- 15.9. Test the functioning.

REFERENCE REPAIR & SERVICE MANUALS

- 1. How to be a successful Electronic Repair by Jestine Yong.
- 2. Electronic Repair guide, com
- 3. A shorted Repaired Model Universal Uni-2040.
- 4. Repairing Guides by Kent.
- 5. Sumsung TV & Mobile servicing guide.



T P C 2 0 2

AIMS

- To be able to understand the basic concepts of environment and environmental pollution.
- To be able to understand the concepts of ecology and ecosystems
- To be able to understand the basic concepts of environmental degradation relating to industrial production.
- To be able to understand the major environmental issues and problems.
- To be able to understand legislative measures to protect environment.

SHORT DESCRIPTION

Basic concepts of environment; natural resources; biogeochemical cycling; ecology and ecosystem; air; water; soil; solid waste management; development and environment; global environmental challenges; legislative protection of environment.

DETAIL DESCRIPTION

- 1. Understand the multidisciplinary nature of environmental studies.
 - 1.1. Define environment, nature, pollution, pollutant, contaminant.
 - 1.2. Describe the scope of environmental studies.
 - 1.3. Describe the importance of environmental studies.
 - 1.4. Describe the formation and structure of the Earth.
 - 1.5. Describe the earth's natural system.
 - 1.6. Describe the changing attitudes to the natural world.
 - 1.7. Mention the main components of environment.
 - 1.8. Define natural and man-made environment.
 - 1.9. Distinguish between natural and man-made environment.

2. Understand the natural resources.

- 2.1. Define natural resources.
- 2.2. Classify natural resources.
- 2.3. Describe forest resources.
- 2.4. Describe water resources.
- 2.5. Describe mineral resources.
- 2.6. Describe food resources.
- 2.7. Describe energy resources.
- 2.8. Describe land resources.
- 2.9. Describe environmental problem relating to resources use.
- 2.10. Describe the role of an individual in conservation of natural resources.

3. Understand the biogeochemical cycling.

- 3.1. Define biogeochemical cycle.
- 3.2. Describe hydrologic cycle.
- 3.3. Describe carbon cycle.
- 3.4. Describe nitrogen cycle.
- 3.5. Describe oxygen cycle.

- 3.6. Describe phosphorus cycle.
- 3.7. Describe sulfur cycle.
- 3.8. Describe nutrient cycle.

4. Understand the ecology and ecosystem.

- 4.1. Define ecology and ecosystem.
- 4.2. Structure and function of an ecosystem.
- 4.3. Describe the components of ecosystem.
- 4.4. Explain the stability of ecosystem.
- 4.5. Describe ecological factors.
- 4.6. Describe interdependency between abiotic and biotic component.
- 4.7. Describe the meaning of following terms: species, population, community, ecological succession, community periodicity, climax community, ecological niche, habitat, plankton, nekton, ecological indicator, evolution, adaptation, producers, consumers, decomposers, food chains, food webs, ecological pyramids, bio-concentration, bio-magnification, biodiversity, threatened species, endanger species, extinct species, exotic species, biodiversity conservation and biogeography.
- 4.8. Describe energy flow in the ecosystem.
- 4.9. Describe the ecosystem of pond, ocean, estuary, grassland, cropland, forest, desert and mangrove.

5. Understand the air as a component of environment.

- 5.1. Define air.
- 5.2. Describe the composition of the clean dry atmospheric air at ground level.
- 5.3. Describe the atmospheric structure.
- 5.4. Define air pollution.
- 5.5. Describe major air pollutants and their impacts.
- 5.6. Describe the sources of air pollutants.
- 5.7. Explain the formation of photochemical smog and its effects.
- 5.8. Describe the effects of air pollution on vegetation, animal, human health and materials and resources.
- 5.9. Define sound and noise.
- 5.10. Describe the classification of sound.
- 5.11. Describe the effects of noise.

6. Understand the water as a component of environment.

- 6.1. Define water.
- 6.2. Describe the characteristics of water.
- 6.3. Describe the sources of water.
- 6.4. Describe the uses of water.
- 6.5. Explain that the water is a universal solvent.
- 6.6. Define water pollution, biological oxygen demand (BOD), effluent treatment plant (ETP).
- 6.7. Describe the sources of water pollution.
- 6.8. Describe the effects of water pollution.

7. Understand the soil as a component of environment.

- 7.1. Define soil.
- 7.2. Describe the constituents of soil.
- 7.3. Define soil pollution.
- 7.4. Describe causes soil degradation.

- 7.5. Describe the sources of soil pollution.
- 7.6. Describe the effects of soil pollution.

8. Understand the concept of solid waste management.

- 8.1. Define solid waste, refuse, garbage, rubbish, trashes, demolition and construction waste, ewaste, agricultural waste, pathological waste, radioactive waste, hazardous waste, 3R, 4R.
- 8.2. List the sources of solid waste.
- 8.3. Mention the classification of solid waste.
- 8.4. Mention the methods of collection of solid waste.
- 8.5. Describe the recycling of solid wastes.
- 8.6. Describe resource recovery from solid waste.
- 8.7. Describe the potential method of disposal of solid waste.
- 8.8. Describe control measures of urban and industrial wastes.

9. Understand the development and environment.

- 9.1. Define environmental ethics and environmental stress.
- 9.2. Describe environmental stress.
- 9.3. Define sustainable development.
- 9.4. Define urbanization.
- 9.5. Describe the causes of urbanization.
- 9.6. Describe the effects of urbanization on environment.
- 9.7. Define industrialization.
- 9.8. Describe the causes of industrialization.
- 9.9. Describe the effects of industrialization on environment.

10. Understand the global environmental challenges.

- 10.1. Define greenhouse gas and greenhouse effects.
- 10.2. Make a list of greenhouse gases and their contribution on greenhouse effects.
- 10.3. Describe the causes and consequences of greenhouse effects.
- 10.4. Describe acid rain.
- 10.5. Describe importance of ozone layer.
- 10.6. Define ozone depleting substances (ODS).
- 10.7. Describe ozone layer depletion mechanism.
- 10.8. Describe hazardous waste.
- 10.9. Describe chemicals pesticides.
- 10.10. Describe radioactive pollution.
- 10.11. Describe natural disaster.

11. Understand the legislative protection of environment.

- 11.1. Define environmental impact assessment (EIA) and environmental auditing (EA).
- 11.2. Mention environmental act and legislations prescribed for air, noise, water, soil and wild life protection.
- 11.3. Describe environmental conservation act 1995 in Bangladesh.
- 11.4. Describe the environment conservation rule 1997 in Bangladesh.
- 11.5. Describe the environmental framework in Bangladesh.
- 11.6. Describe The Montreal Protocol and The Kyoto Protocol.
- 11.7. Describe role of an individual in prevention of pollution.

REFERENCES:

- 1. Fundamentals of Environmental Studies, Mahua Basu and S. Xavier, Cambridge.
- 2. Ecology and Environment, P.D. Sharma, Rastogi Publications.
- 3. Basics of Environmental Science, Michael Allaby, Routledge.
- 4. Environmental Science, Jonathan Turk and Amos Turk, Sauders golden sunburst series.

65851 Accounting Theory & Practice

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.
- •To be able to understand the concept of income tax , VAT & Public works accounts.

Course Outlines

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

DESCRIPTION;

Theory

1. 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. Transactions Analysis.

- 2.1 Define transactions and business transaction.
- 2.2 Describe the characteristics of transaction.
- 2.3 Discuss the classification of transaction.

3. Entry system of Accounting.

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

4. 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 Define accounting cycle.

5. Journal.

- 5.1 Define Journal.
- 5.2 State the functions of Journal.
- 5.3 Mention the various names of Journal.
- 5.4 Interpret the form of Journal.

6. 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 Explain why ledger is called the king of all books of accounts.
- 6.6 Explain the following terms: Balance, Balancing; Debit balance; credit balance.

7. Cash book & Its Classification.

- 7.1 Define cash book.
- 7.2 Classification of cash book.
- 7.3 Explain cash book as both Journal and Ledger.
- 7.4 Define discount.
- 7.5 Explain the different types of discount.

8. 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 ledger balance. (practical)

9. Final accounts.

- 9.1 State the components of final account.
- 9.2 Distinguish between trial balance and balance sheet.
- 9.3 Select the items to be posted in the trading account, profit & loss account and the balance sheet.
- 9.4 State the adjustment to be made from the given information below or above the trial balance.
- 9.5 Explain the following terms: revenue expenditure; capital expenditure; depreciation; annuity method demnishing balance method, machine hour method

10. Cost and financial accounting.

- 10.1 Define financial accounting.
- 10.2 State the objectives of financial accounting.
- 10.3 Define cost accounting.
- 10.4 State the elements of direct cost and indirect cost.
- 10.5 Discuss the capital budgeting
- 10.6 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. Income Tax

- 11.1 Define Income Tax.
- 11.2 State the objects of Income Tax.
- 11.3 Classification of assesses.
- 11.4 Taxable income of assesses.
- 11.5 Tax rebate.
- 11.6 Explain the following terms: Income tax year; assessment year, NBR.

12. 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 Define Value Added Tex (VAT)
- 12.4 State the merits and demerits of VAT.
- 12.5 Explain the following terms : Revenue ; Grant ; Bill; Voucher.

PRACTICAL

- 1. Identify the transaction from given statements stating reasons.
- 2. Determine Debtor (Dr) and Creditor (Cr.) from given transactions applying golden rules.
- 3. Journalize from given transactions.
- 4. Prepare ledger from given transactions.
- 5. Prepare double column cash book from given transactions showing balances.
- 6. Prepare triple column cash book from given transaction and find out the balances.
- 7. Prepare analytical and imprest system of cash book.
- 8. Prepare trial balance from the given ledger balance.
- 9. Prepare trading account, profit & loss account and balance sheet from the given trial balance & other information.
- 10. Prepare cost sheet showing prime cost, factory cost, cost of production, total cost and selling price.

REFERENCE BOOKS

- 1. Book-keeping & Accounting
 - Prof. Gazi Abdus Salam
 Hafiz uddin

- Prof. Asimuddin Mondol

- 2. Principles of Accounting
- Cost Accounting
 4. হিসাবরক্ষণ ও হিসাববিজ্ঞান
- পরেশ মণ্ডল
- 5. উচ্চ মাধ্যমিক হিসাববিজ্ঞান
- 6. আয়কর

- হক ও হোসাইন
 - ড. মনজুর মোরশেদ