



BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207

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

ELECTRONICS TECHNOLOGY

TECHNOLOGY CODE: **668**

6th SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

ELECTRONICS TECHNOLOGY

6th SEMESTER

Sl. No	Subject Code	Name of the subject	T	P	C	Marks				Total
						Theory		Practical		
						Cont. assess	Final exam	Cont. assess	Final exam	
1	66861	Electronic Measurements	2	3	3	40	60	25	25	150
2	66862	TV Broadcasting and Studio	2	3	3	40	60	25	25	150
3	66863	Instrumentation & Process Control	2	3	3	40	60	25	25	150
4	66662	Microprocessor and Interfacing	2	3	3	40	60	25	25	150
5	66864	Microcontroller & embedded system	2	3	3	40	60	25	25	150
6	66865	Electronic Project -1 (Contd...)	0	6	2	0	0	50	50	100
7	65852	Industrial Management	2	0	2	40	60	0	0	100
Total			13	21	20	260	390	175	175	1000

AIMS

To provide the student with various opportunity to acquire knowledge, skill and attitude in the area of measurements of electrical & Electronics quantities with special emphasis on;

- Accuracy, precision, sensitivity and error in electrical and electronic measuring system.
- Concept different types of electrical measurements.
- Selection of correct type of meters for particular measurement.
- Concept of measurement by using analog and digital types of ammeter, voltmeter, multi-meter, oscilloscope, wave analyzer, LCR meter, Q-meter, frequency meter, distortion meter, power factor meter, RX meter, IC tester, Transistor tester and, photometer.

SHORT DESCRIPTION

Measurement of Low resistance, Medium and high resistance, Measurement of Inductance and Capacitance. Features of Special measurement. Measurement of power, power factor, frequency and phase angle. Measurement of radiation, IC and Transistor tester.

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

- 1.1 Define measurements.
- 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 Explain range and span of a measuring instruments
- 1.6 Describe errors in measurements.
- 1.7 Define the loading effect.
- 1.8 Explain the loading effects of ammeter and voltmeter.
- 1.9 Solve problems related to errors in measurement.

2. Understand the measurement of low resistance.

- 2.1 Explain low, medium and high range of resistance.
- 2.2 List the methods of measurement of low resistance.
- 2.3 Describe the ammeter – voltmeter method.

3. Understand the measurement of medium & high resistance.

- 3.1 List the method of measurement of medium resistance.
- 3.2 Describe Wheatstone bridge method of measurement of medium resistance.
- 3.3 Mention the advantages of Wheatstone bridge method.
- 3.4 Discuss the precaution in measuring medium resistance by Wheatstone bridge method.
- 3.5 Describe the methods of testing for the localization of underground cable fault.
- 3.6 Describe the Murray and Varley loop test methods for localization of cable faults.
- 3.7 Describe the method of measuring of high resistance using megger.
- 3.8 Solve problems related to Wheatstone bridge method.

4. Understand the features of Impedance Bridge.

- 4.1 Describe the method of measurement of inductance by Maxwell's inductance bridge.
- 4.2 Describe the method of measurement of capacitance by Maxwell's inductance-capacitance bridge.
- 4.3 Explain the principle of Wein's bridge.
- 4.4 Describe method of measurement of inductance, capacitance using automatic bridge.
- 4.5 Describe the process of measurement parallel circuit resistance & inductance using RX meter
- 4.6 Solve Problem on R, L & C measurement using Ac Bridge.

- 5. Understand the features of special measurement**
 - 5.1 Describe the process of audio power measurement.
 - 5.2 Discuss the process of measurement of quality factor using Q meter.
 - 5.3 Describe measurement of spectrum of a signal using spectrum Analyzer.
 - 5.4 Illustrate the method of measuring noise of a communication circuit using psopho meter.
- 6. Understand the measurement of power.**
 - 6.1 Discuss different method of measuring electrical power
 - 6.2 Explain Power measurement by ammeter-voltmeter method
 - 6.3 Describe power measurement by wattmeter
 - 6.4 Describe the process of RF power measurement
 - 6.5 Solve Problem related power measurement
- 7. Understand the measurement of power factor.**
 - 7.1 Define Power factor
 - 7.2 State the formula of power factor.
 - 7.3 Discuss different method of measuring power factor
 - 7.4 Describe measurement of power factor using power factor meter
- 8. Understand the measurement of phase & frequency.**
 - 8.1 Define Phase & frequency
 - 8.2 Discuss different methods of measurement of phase & frequency
 - 8.3 Measurement of frequency using mechanical resonance method.
 - 8.4 Measurement of frequency using electrical resonance method.
 - 8.5 Describe the method for detection of phase using phase sequence indicator.
- 9. Measurement of Voltage, current, phase & frequency.**
 - 9.1 Describe the Procedure of measurement voltage, current, phase & frequency using CRO.
 - 9.2 Describe frequency and phase angle measurement using Lissajous Pattern.
 - 9.3 Describe Signal store of a digital storage oscilloscope
 - 9.4 Describe the method for determining rise and fall time of a signal using CRO.
- 10. Measurement of radiation**
 - 10.1 Define radiation & radioactivity.
 - 10.2 Discuss different methods of measurement of radiation
 - 10.3 Describe measurement of radiation using Dosimeter
 - 10.4 Describe measurement of radiation using Geiger Counter
 - 10.5 Describe measurement of radiation using Scintillation Counter
- 11. Transistors & IC tester**
 - 11.1 Discuss different procedures for testing semi-conductor devices(transistor, FET,IC etc.).
 - 11.2 Explain the process of measuring forward current gain of a transistor by transistor tester
 - 11.3 Explain the process of measuring leakage current of a transistor by transistor tester.
 - 11.4 Describe the procedure of digital & analog IC by IC tester.

PRACTICAL:

- 1 Measurement of low resistance by Ammeter–Voltmeter method.**
 - 1.1 Draw the circuit diagram for the measurement of low resistance by ammeter-voltmeter method.
 - 1.2 Connect the tools, equipment and materials required.
 - 1.3 Prepare the circuit according to the circuit diagram using proper equipment.
 - 1.4 Check the circuit before connecting power supply.
 - 1.5 Record the meter readings.
 - 1.6 Calculate the resistance from the meter readings.

- 2 Measurement of medium resistance by Wheatstone bridge.**
 - 2.1 Draw the circuit diagram for measuring medium resistance by Wheatstone bridge.
 - 2.2 Select tools, equipment and materials required.
 - 2.3 Prepare the circuit according to the circuit diagram.
 - 2.4 Check all the connection before connecting power supply.
 - 2.5 Record the meter readings.
 - 2.6 Calculate the value of unknown resistance.

- 3 Measurement of high resistance by a megger.**
 - 3.1 Select a high resistance.
 - 3.2 Select a megger.
 - 3.3 Connect the resistance with the megger.
 - 3.4 Measure the resistance from the reading of the megger.

- 4 Measurement of frequency by a frequency meter.**
 - 4.1 Sketch the circuit diagram.
 - 4.2 Select a frequency meter.
 - 4.3 Select tools, equipment and materials.
 - 4.4 Connect the frequency meter to the supply or circuit whose frequency is to be measured.
 - 4.5 Measure the supply frequency from the meter.

- 5 Measurement of power factor by a power factor meter.**
 - 5.1 Sketch the circuit diagram for measurement of power factor of a load by a power factor meter.
 - 5.2 Select the tools, equipment and materials required.
 - 5.3 Prepare the circuit according to the circuit diagram using proper equipment.
 - 5.4 Check the circuit before connecting power supply.
 - 5.5 Record power factor from the power factor meter.

- 6. Measure the resistance, inductance and capacitance using RLC Bridge.**
 - 6.1. Select the bridge with required materials.
 - 6.2. Connect the component to be measured to the unknown arm.
 - 6.3. Set up the knobs for proper measurement.
 - 6.4. Switch on the power supply and adjust for the null position.
 - 6.5. Determine the value of the unknown parameter.

- 7. Measure the Q of a coil with a Q-meter.**
 - 7.1. Select a Q-meter, radio frequency coil and required materials.
 - 7.2. Connect the coil with the Q-meter.
 - 7.3. on the power supply.
 - 7.4. Make proper adjustment.
 - 7.5. Determine Q of the coil directly.

- 8. Measure the separate resistive and reactive components by RX meter.**
 - 8.1. Select required equipment, tools and materials.
 - 8.2. Construct the circuit as per diagram.
 - 8.3. Connect oscillator to the bridge and other to the mixer.
 - 8.4. Adjust frequency of oscillators.
 - 8.5. Adjust variable resistance and capacitance for null meter.
 - 8.6. Observe the reading of the dial for parallel impedance.

9. **Measure voltage, time period and frequency using a CRO.**
 - 9.1. Select a CRO and some signal source for measurement.
 - 9.2. Connect the signal probe to oscillator input.
 - 9.3. Switch on the power supplies.
 - 9.4. Adjust the voltage and sweep selector knob.
 - 9.5. Adjust other required controls.
 - 9.6. Observe the wave shape.
 - 9.7. Record horizontal distance and vertical distance for a single wave.
 - 9.8. Calculate voltage, time period and frequency from the knob's settings.

10. **Measure the rise, fall and delay time using a CRO.**
 - 10.1. Select the appropriate oscilloscope, required signal source and materials.
 - 10.2. Connect the signal input to the oscilloscope.
 - 10.3. Switch on the power supply.
 - 10.4. Make required adjustments.
 - 10.5. Observe the condition of the signal.
 - 10.6. Determine the value of rise, fall and delay time from the conditions.

11. **Test the transistor using semiconductor tester.**
 - 11.1. Select the equipment and required tools & materials.
 - 11.2. Set the transistor in the proper place for testing.
 - 11.3. Switch on the power supply.
 - 11.4. Make required adjustment.
 - 11.5. Observe the condition of the component.
 - 11.6. Note the result.
 - 11.7. Calculate Forward current gain and Leakage current.

12. **Test the diode, SCR and FET using semiconductor tester.**
 - 12.1. Select required tools, equipment and materials.
 - 12.2. Set the test device in the proper place.
 - 12.3. Switch on the power supply.
 - 12.4. Make required adjustment.
 - 12.5. Observe the condition of the component.
 - 12.6. Observe the curve.
 - 12.7. Note the result.

REFERENCE BOOKS

1. A course in Electrical and electronic measurements and instrumentation
– A. K. Sawhrey.
2. A Text Book of Electrical Technology
– B.L. Theraja
3. Electric Instrumentation
– H. S. Kalsi
4. Industrial Instrumentation and control
–S. K Singh.
5. Elements of Electronic Instrumentation and Measurement
–Joseph J. Carr

OBJECTIVES

Upon completion of these content student will be able to achieve and acquire knowledge, skills and attitude in Thearea ofTV Broadcasting & Studiospecial emphasis on:

- TV Broadcasting System.
- Systems of TV Signal Broadcasting.
- TV Studio & Studio facilities.
- TV Studio Instruments.

SHORT DESCRIPTION

Television Broadcasting System, Organization of Television Studio, Television Recording Studio, Layout of Television Broadcasting Station: video equipment, audio equipment, lighting arrangement, display devices, public address system, camera control unit and video server, Video Shooting Camera, Outside Broadcasting(OB) and Radio MASTs & Towers.

Theory:**1. Understand the TV Broadcasting System**

- 1.1. Define TV Broadcasting System.
- 1.2. List the features of TV Broadcasting System.
- 1.3. Draw the Basic Block Diagram of TV Broadcasting Station.
- 1.4. Describe Media Room, News Room, Editing Room, Screening Room, Linear Editing Room, Green Room, Dressing Room, VTR Room and Auditorium.
- 1.5. Explain the function of Transmission room.
- 1.6. Describe Camera Control Unit (CCU).
- 1.7. State the functions of Producer Room.
- 1.8. Describe Theatre Room.

2. Understand the Organization of Television Studio

- 2.1. Define TV Studio.
- 2.2. List the TV Studio Floor Items: professional video camera, microphone, stage lighting, video monitor, public address system.
- 2.3. Mention the basic audio, video sources and controls in the studio.
- 2.4. Draw the block diagram of a typical broadcasting studio and describe the function of each block.
- 2.5. Explain the function of digital slide show, background super imposition, video mixing, scroll display, advertisement superimposing etc.
- 2.6. State the principle of audio & video dubbing.
- 2.7. Mention the basic principle of audio & video editing.

3. Understand the Television Recording Studio

- 3.1. Mention the recording studio equipment.
- 3.2. List different video camera used in recording studio.
- 3.3. Describe the camera control system in recording studio with block diagram.
- 3.4. Explain the sound control system in recording studio.
- 3.5. List different types of lighting arrangement in recording studio.
- 3.6. Describe the light control system in recording studio.
- 3.7. State the echo effects of audio recording.
- 3.8. State the technique of acoustic tuning and echo reflection in audio recording.
- 3.9. Design and Construction of combining sound proofing performance and shielding performance.

4. Understand functional layout of Television Broadcasting Station

- 4.1. Mention the characteristic of TV studio.
- 4.2. Mention the necessity of cyclorama (large concave background wall) for recording video in addition to sound recording.
- 4.3. Describe the characteristics of a radio studio.
- 4.4. Mention the characteristics of a distribution studio.
- 4.5. Describe the function of screening room and movie theatre.
- 4.6. Determine the acoustic explanation of screening room and movie theatre.
- 4.7. Describe the postproduction work and the role of the studio.
- 4.8. Mention the Characteristics of dubbing MA (Multi Audio) Studio.
- 4.9. Describe the function of a video editing studio& film production studio.

5. Understand the video equipment used in Broadcasting Studio

- 5.1. Define Professional Video Camera.
- 5.2. State the difference between studio camera and Professional Video Camera.
- 5.3. Describe the function of ENG camera.
- 5.4. State the features of a EFP (Electronic Field Production) camera.
- 5.5. Mention the merits of remote-controlled camera.
- 5.6. Describe the basic block diagram of a Camera Controlled Unit (CCU).
- 5.7. State the function of a block camera.
- 5.8. Describe the principle of operation of a lipstick camera.

6. Understand the Audio Equipment used in television broadcasting system

- 6.1. Define dynamic microphone.
- 6.2. State the principle of operation of a dynamic microphone.
- 6.3. Classify TV studio microphone.
- 6.4. State the Characteristics of standard TV studio microphone.
- 6.5. Mention the function and merits of a dynamic microphone.
- 6.6. Describe the basic principle of operation of a Ribbon microphone.
- 6.7. Distinguish between Ribbon microphone and Fiber optic microphone.
- 6.8. Describe the principle of operation of a laser microphone.
- 6.9. Mention the advantages of MEMS (Micro Electro Mechanical System) and Boom microphone.

7. Understand the Lighting arrangement of a broadcasting studio

- 7.1. State the principle of stage lighting.
- 7.2. Describe the qualities of lighting: Intensity, color, direction, focus & Shading.
- 7.3. Describe the operation of light control console: dimming, glowing, light temperature, dazzling, light effect, ellipsoidal reflector spot light, moving light.
- 7.4. State the principle of a flood lighting system.
- 7.5. Describe the principle of wash lighting system.
- 7.6. Explain the operation of HID (High Intensity Discharge) lamp.
- 7.7. Describe the dimming effect of light control system.

8. Understand the display devices and public address system

- 8.1. Define display device.
- 8.2. Describe the working principle of segment display.
- 8.3. Explain the principle of operation of 2-dimensional display.
- 8.4. Explain the principle of operation of 3-dimensional display.
- 8.5. State the public address system.
- 8.6. Draw the simple block diagram of a public address system.
- 8.7. Describe the principle of hardware character generator and character generator protocol.

9. Understand Camera Control unit (CCU)

- 9.1. Define the terms SDI, YUV, DVE, DAW, CTF & NDF.
- 9.2. Draw a simple block diagram of CCU connection.
- 9.3. Explain Gamma correction and pedestal (Master Black) of camera signal.
- 9.4. Describe the master gain control system of CCU.
- 9.5. State the technique of digital video effect in film.
- 9.6. Describe the terms: Integrated DAWS, Software DAWS, Multi track DAWS, Open Source, Software, Open Source Sequencer, Digital Audio Interface(DAI) and Echo Digital Audio(EDA).
- 9.7. Define Video Server.
- 9.8. Describe the function of Video Server.
- 9.9. Mention the features of Video Server.

10. Understand Video Shooting Camera

- 10.1. State different types of Indoor video camera.
- 10.2. Mention the characteristics of a professional video camera.
- 10.3. State the features of a professional video camera.
- 10.4. Describe the function of a night vision camera.
- 10.5. State the different uses of EFP cameras and ENG (Electronic News Gathering) camera.
- 10.6. Draw and describe the block diagram of a CCD Camera.
- 10.7. Draw the block diagram ENG camera.

11. Understand Outside Broadcasting (OB)

- 11.1. Define the term Outside Broadcasting.
- 11.2. Mention the application of Outside Broadcasting.
- 11.3. Draw the block diagram of Outside Broadcasting.
- 11.4. State the principle of EFP (Electronic Field Production).
- 11.5. List the steps of Outside Broadcasting of Live football match.
- 11.6. List the steps of Outside Broadcasting of a Live speech of National Assembly.

12. Understand Radio MASTs & Towers

- 12.1. Define Radio MASTs & Towers.
- 12.2. Describe the construction of mast radiator.
- 12.3. Describe the principle of operation reinforced concrete Towers.
- 12.4. State the difference between numerous concrete Towers and lattice towers.
- 12.5. Describe the construction of a Felsenegg-Girstel TV-tower.
- 12.6. State the Construction of a Uetlibery TV-Tower.
- 12.7. Mention the use of Towers for outside broadcasting.

Practical:

1. Students will visit TV Broadcast Station and able to understand TV Broadcasting

- 1.1. Make Sketch of instrument set up in news room.
- 1.2. Mention the function of shadow monitor.
- 1.3. Verify the sound proof room use for news room.
- 1.4. Identify the VTR recording system programs.
- 1.5. Use program materials for different recording location.
- 1.6. Identify the different types of VTRs used in the VTR room.
- 1.7. Observe the cable connection for interfacing VTRs.

2. Understand the TV Broadcasting (Continue....)

- 2.1. Describe the process of video editing panel with audio console panel.
- 2.2. Describe the process of audio dubbing accordance with video scene.
- 2.3. Describe the process of video effect to the film.
- 2.4. List the makeup items used in the makeup room.
- 2.5. List the different facilities provides in the makeup room.
- 2.6. Demonstration the decoration in a dressing room.
- 2.7. Recognize the media room according to the facilities used.

3. Understand the TV Broadcasting (Continue....)

- 3.1. Identify the different indoor video cameras in studio.
- 3.2. Identify the different types of microphone used in studio.
- 3.3. Identify the public address system and observe the function of it.
- 3.4. Identify the equipment and accessories used in production control room.
- 3.5. List the activities of producer in the shooting program.
- 3.6. List the activities of cameramen in shooting program.
- 3.7. Observe the conversation through throat microphone and earphone between producer and cameramen.

4. Understand the TV Broadcasting (Continue....)

- 4.1. List the instruments and accessories used in master control room.
- 4.2. Identify the different video monitors used in different location: news room, recording sub room, auditorium, VTR room etc.
- 4.3. Identify the MASTs control panel and select the stand by selector knob, ON air selector knob etc.
- 4.4. Identify the character generator and observe the output signals in respective monitors.
- 4.5. Identify camera control unit and technic to setup black level & Gama correction of camera.
- 4.6. State the function of producer in camera control unit.
- 4.7. Identify the inter connection facility of CCU with the different cameras used for recording.
- 4.8. Describe the video and audio monitors for recording in the control room.

5. Understand the TV Broadcasting (Continue....)

- 5.1. Observe video mixing in the video console through mixer panel and respond for output product.
- 5.2. Describe the light control panel used in different scene and location for video shooting.
- 5.3. Identify acoustic system used for sound system.
- 5.4. Describe echo effect used in audio recording.
- 5.5. Describe shadow effect used in video shooting.
- 5.6. Describe acoustic tuning and echo reflection in audio recording.

6. Understand the TV Broadcasting (Continue....)

- 6.1. Describe screening room and use of screening room.
- 6.2. Describe movie theatre and performance of a movie theatre.
- 6.3. State the characteristics of film production studio.
- 6.4. Describe Outside Broadcasting.
- 6.5. Identify different instruments and accessories used in Outside Broadcasting (OB) van.
- 6.6. Observe the broadcast principle of a Outside Broadcasting(OB) van.
- 6.7. List the function of ENG camera for news collection.

7. Understand the TV Broadcasting (Continue....)

- 7.1. Describe the multifunction performance in a Multi Audio(MA) studio.
- 7.2. Observe stage lighting system.
- 7.3. State the light changeover in dark recording and sunlight recording.
- 7.4. Describe the technics of intensity, color, focus & shading in a shooting spot in a studio shooting.
- 7.5. State the function of dazzling light effect in a required video recording.
- 7.6. Describe the operation of HID (High Intensity Discharge) lamp.
- 7.7. Use of spot light in a shooting scene.

8. Understand the TV Broadcasting (Continue....)

- 8.1. Sketch the layout diagram of public address system.
- 8.2. List different types of display unit.
- 8.3. Mention the characteristics of a hardware character generator.
- 8.4. Mention the use of character generator protocol.
- 8.5. Identify the black level trim and gain trim for Res, Green and Blue components of camera signal.
- 8.6. State the process of audio/video effects in video editing.
- 8.7. State the different functions of DAWS (Digital Audio Work Station).

9. Understand video editing in a PC with the help of professional video editing software.

- 9.1. Download the professional video editing software: AVS video editor/Corel video studio/Pinnacle Studio/Sony Vegas Pro/I movie/Adobe Premier pro etc.
- 9.2. Select different tools of software.
- 9.3. Select inputs of video and audio.
- 9.4. Choose different types of effect.
- 9.5. Select time frame.
- 9.6. Start editing.
- 9.7. Observe preview of edit output.

10. Understand professional video camera

- 10.1. Select a video camera.
- 10.2. Collect tools and equipment.
- 10.3. Open the camera case.
- 10.4. Identify the different major parts (shutter, aperture, memory card, lens, LCD screen & Flash)
- 10.5. Identify different control & view finders.
- 10.6. Provide required power and input video signal to the camera and observe the image in view finder.

11. Understand different microphones used in TV Studio

- 11.1. Select the TV studio microphone: dynamic (Omni-directional/Bi-directional)microphone, Ribbon microphone, Fiber optic microphone, lesser microphone, Short gun microphone and Boom microphone.
- 11.2. Select required tools and equipment.
- 11.3. Set the microphone for operation.
- 11.4. Connect microphone output to a db gain instrument and observe the gain quality.
- 11.5. Measure the frequency system of different microphones.
- 11.6. Select the quality microphone for recording in TV studio.

12. Understand outdoor shooting

- 12.1. Collect video camera, Tripod, light shading wide angle 300m lens, weather gear (camera raincoat, ground tarp, umbrella etc.),polarization filter, power supply unit.
- 12.2. Hire a vehicle.
- 12.3. Select shooting location.
- 12.4. Prepare a shooting script.
- 12.5. Create shooting environment.
- 12.6. Start shooting and records in camera.
- 12.7. Start shooting and records in camera.

REFERENCE BOOKS:

1. Monochrome and Color Television
– R RGulati
2. Basic Television and Video Systems
-- BenrardGrob
3. Dictionary of Communication & Video Studio
-- Watson james
4. Encyclopedia of Television
-- Horace New Coms
5. Museum of Broadcast Communications Encyclopedia
-- Sterling Christophen

OBJECTIVES

Upon completion of these content student will be able to achieve and acquire knowledge, skills and attitude in the area of instrumentation and process control with special emphasis on:

- Transducer
- Signal conditioning
- Recorders.
- Measuring techniques of special quantities
- Data acquisition
- Control theory
- Servo control

SHORT DESCRIPTION

Transducers; Passive transducer; Self generating type transducer; Measuring technique by transducer; Signal conditioning; Recorders; Measuring techniques of special quantities; Data acquisition; Control theory; Servo control;

DETAIL DESCRIPTION**Theory:****1. Understand the basic features of transducers.**

- 1.1 Define transducer and sensor.
- 1.2 Mention different types of transducer and sensor.
- 1.3 Describe difference between transducers and sensors
- 1.4 Describe the parameters of electrical transducer.
- 1.5 Describe the factors to be considered in selecting a transducer.
- 1.6 Describe mechanical devices as primary detector.
- 1.7 Mention the different electrical phenomena employed in transducers.

2 Understand the features of passive transducers.

- 2.1 Describe the operation of different types of resistive transducers.
- 2.2 Explain the basic principle of strain gauges
- 2.3 Describe the working principle of resistance thermometer.
- 2.4 Describe the construction of different types of thermistor.
- 2.5 Describe the working principle of inductive transducer.
- 2.6 Describe the construction and working principle of linear variable differential transformer (LVDT)
- 2.7 Describe the displacement measurement by using LVDT.
- 2.8 Describe the construction and working principle of Rotary variable differential transformer (RVDT)
- 2.9 Describe the working principle of pressure inductive transducer.
- 2.10 Describe the working principle of pressure capacitive transducer.

3 Understand the features of self-generating type transducers.

- 3.1 Describe the working principle of Piezoelectric transducers
- 3.2 Explain the basic principle of photo emissive, photoconductive and photo voltaic cell.
- 3.3 Define seebeck effect.

- 3.4 Describe the construction of thermocouples and thermopile.
 - 3.5 Explain the working principle of thermocouple and thermopile.
 - 3.6 Describe the concept of digital encoding transducer
 - 3.7. Describe the principle and operation of optical displacement transducer.
 - 3.8 Describe the principle and operation of photo optic transducer.
- 4 Understand the measuring technique by using transducers.**
- 4.1 Describe the weight measuring technique by load cell (pressure cell).
 - 4.2 Explain the basic principle of resistance temperature detector (RTD).
 - 4.3 Explain the basic principle of reluctance pulse pick-up.
 - 4.4 Describe the working principle of magnetic flow meter.
 - 4.5 Describe the sound intensity measurement technique by capacitor microphone.
 - 4.6 Describe the liquid level measurement technique by dielectric gauge.
 - 4.7 Explain synchro system.
 - 4.8 Describe the angular displacement measurement technique by synchro system.
- 5 Understand the concept of signal conditioning.**
- 5.1 Describe signal conditioning system with block diagram.
 - 5.2 Explain the basic principles of DC and AC signal conditioning system.
 - 5.3 Explain the basic principle of data conversion system.
 - 5.4 Describe the operation of an instrumentation amplifier.
 - 5.5 Describe the basic principle of instrumentation system.
 - 5.7 Describe telemetry with block diagram.
- 6 Understand the features of recorders.**
- 6.1 State the necessity of recorder in instrumentation system.
 - 6.2 State different types of recorders.
 - 6.3 Describe the principle of operation of strip chart recorder.
 - 6.4 Describe the principle of operation of X-Y recorder (galvanometer and null type).
 - 6.5 Describe the principle of operation of magnetic recorder.
 - 6.6 Describe the principle of operation of digital recorder.
- 7 Understand the measuring techniques of special quantities.**
- 7.1 Describe the method of Temperature, compensation and cancellation Techniques.
 - 7.2 Describe the method of measurement of pressure using electrical transducer
 - 7.3 Describe the method of measurement of torque by using different method such as by inductive transducer, digital method.
 - 7.4 Describe the method of measurement of temperature by using thermometer, thermocouple.
 - 7.5 Describe the method of measurement of flow by electromagnetic flow meter.
 - 7.6 Describe the method of measurement of humidity by humidity hygrometers
- 8 Understand the concept of data acquisition.**
- 8.1 Define data acquisition.
 - 8.2 Describe the component of analog and digital data acquisition system.
 - 8.3 Describe the principle single channel and multi channel data acquisition system.
 - 8.4 Describe the basic principle of operation of data logger.
 - 8.5 Describe the method of data transmission.
 - 8.6 Describe the digital recording and use of recorder in digital system.

9 Understand the concept of control theory.

- 9.1 Mention the types of control systems.
- 9.2 Define open loop & closed loop control system.
- 9.3 State the meaning of transfer lag.
- 9.4 Describe two-step & three step control systems.
- 9.5 Describe proportional, derivative and integral control.
- 9.6 Explain compound control system such as PI, PD, DI & PID control.
- 9.7 Mention the advantages & disadvantages of proportional, derivative and integral control system.

10 Understand the concept of servo control.

- 10.1 Describe the construction of DC servo, AC servo, stepper motor, electrical modulator, hydraulic servomotor and hydraulic modulator.
- 10.2 Describe the principle of operation of DC servo & AC servo stepper motor, electrical modulator, hydraulic servomotor and hydraulic modulator.
- 10.3 Describe the basic concepts of DC position control with servo system.
- 10.4 Describe the idea of AC position control with synchro sensing element.
- 10.5 Describe Online and Offline computer control system with block diagram.

Practical :

1. Measure the displacement by linear variable resistance transducer.

- 1.1 Select a potentiometer and required tools & materials.
- 1.2 Couple the object with sliding contact to the potentiometer.
- 1.3 Build up the circuit for measurement of displacement.
- 1.4 Switch on the power supply.
- 1.5 Measure input and output voltage of the potentiometer.
- 1.6 Measure the displacement or force using appropriate formula.

2. Measure the temperature by resistance thermometer.

- 2.1 Select a resistance thermometer (such as platinum resistance thermometer) and a heat source with mounting facility and required tools & materials.
- 2.2 Measure the thermometer resistance at room temperature.
- 2.3 Record the temperature of heat source.
- 2.4 Make the temperature of the source steady.
- 2.5 Measure the resistance of the thermometer.
- 2.6 Calculate the temperature using appropriate formula.

3. Determine the temperature coefficient of thermistor.

- 3.1 Select a thermistor and required tools & equipment.
- 3.2 Connect the thermistor with measuring equipment.
- 3.3 Provide a temperature regulated heat source for the thermistor.
- 3.4 Rise temperature in step and measure the corresponding resistance of the thermistor.
- 3.5 Plot the data for temperature verses resistance characteristics.
- 3.6 Observe the graph.

4. Measure the thickness of a material by capacitive transducer.

- 4.1 Select an appropriate capacitive transducer with required tools and materials.
- 4.2 Set up the materials to measure the thickness between the plates of the capacitor.
- 4.3 Connect the meter and source as required.
- 4.4 Switch on the power supply.
- 4.5 Measure the capacitance between two plates.
- 4.6 Calculate the thickness using appropriate data and formula.

5. Measure the displacement by linear variable differential transformer (LVDT).

- 5.1 Select an iron core, wire and required tools & equipment.
- 5.2 Construct a LVDT with an iron core and coil with one primary and secondary keeping iron movable.
- 5.3 Connect the primary with AC source.
- 5.4 Connect the two secondary with the oscilloscope.
- 5.5 Move the iron core from left to right.
- 5.6 Observe the wave shapes.
- 5.7 Observe the null position.
- 5.8 Measure the voltage increasing or decreasing with core movement or displacement.

6. Measure the temperature by thermocouple.

- 6.1 Select a thermocouple (such as iron-constant) and required tools & materials.
- 6.2 Connect one end of the thermocouple to a voltmeter with proper arrangement.
- 6.3 Apply heat on the other end of the thermocouple in the fire.
- 6.4 Observe the reading of the meter.
- 6.5 Calibrate the meter for temperature.
- 6.6 Measure the temperature.

7. Measure the strain by strain gauge.

- 7.1 Select a strain gauge bridge and required tools & materials.
- 7.2 Attach the strain gauge at the point where strain or torque is to be measured.
- 7.3 Apply strain.
- 7.4 Read the change in the resistance due to strain.
- 7.5 Calculate the value of strain or torque using appropriate formula.

8. Measure the light intensity by photocell.

- 8.1 Select a photoelectric device, light source and required tools & materials.
- 8.2 Construct the circuit with photoelectric device.
- 8.3 Separate the light source from the photoelectric device with a window having small aperture which is controlled by force summing member of the pressure transducer.
- 8.4 Open the aperture for the photoelectric device.
- 8.5 Measure the change in output.
- 8.6 Measure the light intensity.

9. Measure the vibration by piezoelectric transducer.

- 9.1 Select a Piezoelectric crystal and necessary tools & materials.
- 9.2 Construct the circuit for piezoelectric pickup.

- 9.3 Set up the object whose displacement or pressure is to be measured to the appropriate crystal plane.
- 9.4 Energize the circuit and measure the voltage and hence measure the displacement or pressure.

10. Study the operation of magnetic tape recorder.

- 10.1 Select a magnetic tape recorder.
- 10.2 Observe the tape transport mechanism.
- 10.3 Identify the electronic components of magnetic tape recorder.
- 10.4 Observe the recording and playback operation.

11. Study the operation of PID control system.

- 11.1 Select required tools & materials.
- 11.2 Construct the circuit as per diagram.
- 11.3 Adjust all the controls properly.
- 11.4 Observe the operation of PID control system.

12. Study the operation of closed loop speed control with DC servo system.

- 12.1 Select required equipment, tools & materials.
- 12.2 Construct the circuit as per diagram.
- 12.3 Change the input signal.
- 12.4 Observe mechanism of control.

Reference Books:

- 1. Mechanical and Industrial Measurement
-R. K. Jain
- 2. Control Engineering
-Nole M. Morris
- 3. Feedback Control System Analysis & Synthesis
-J.J.D Azzo
- 4. Industrial Electronics
-G. K. Mithal
- 5. Electrical and Electronic Measurement and Instrumentation
-A.K. Sawhney
- 6. Elements of Electronic Instrumentation and Measurement
-Joseph J. Carr
- 7. Electronic Instrumentation -HS Kalsi
- 8. Control system Engineering -Nagrath and Gopal

AIMS

- To be able to acquire the knowledge on microprocessor, microcomputer.
- To be able to develop the knowledge and skill on the architecture and assembly language programming of 16- bit microprocessor
- To be able to acquire the knowledge and skill on memory, interrupt and I/O interfacing.

SHORT DESCRIPTION

Basic conception of microprocessor and microcomputer; Architecture and addressing mode of Intel 8086 μ p; Instruction timing of Intel 8086 μ p; Memory, input /output and interrupt interfacing of Intel 8086 μ p; Interfacing principle and peripheral devices; programming of Intel 8086/8088; Intel x86 family, multi-core processor idea;

DETAIL DESCRIPTION**Theory:****1. Understand the concept of microprocessor and microcomputer.**

- 1.1. Define the microprocessor and microcomputer.
- 1.2. Distinguish between microprocessor and microcomputer.
- 1.3. Distinguish between microprocessor and microcontroller.
- 1.4. Describe the block diagram of simple microcomputer.
- 1.5. Evaluation of microprocessor (4, 8, 16, 32 & 64 bit microprocessor)

2. Understand the architecture of 8086 microprocessor.

- 2.1. Mention the general features of 8086/8088 microprocessor.
- 2.2. Describe the pin and signal diagram of 8086/8088 microprocessor.
- 2.3. Distinguish between maximum and minimum mode of 8086/8088 microprocessor
- 2.4. Describe the architecture of 8086 microprocessor.
- 2.5. Describe the register structure of 8086 microprocessor.
- 2.6. Mention the difference between 8086 and 8088 microprocessor.

3. Understand the memory interface of the 8086 microprocessor.

- 3.1. Sketch the 8086 system memory interface.
- 3.2. State the meaning of even & odd address boundaries.
- 3.3. Describe the hardware organization of the memory address space of 8086.
- 3.4. Describe the memory read and write bus cycle of 8086 microprocessor. Explain the technique to de-multiplex the system bus.

4. Understand the 8086 addressing mode and programming concept.

- 4.1. Describe the addressing mode of 8086 microprocessor.
- 4.2. Describe the software model of the 8086 microprocessor.
- 4.3. Describe the 8086 instruction set.
- 4.4. Explain the instruction format of 8086 microprocessor.

5. Understand the input / output interface and peripheral devices of the 8086 microprocessor.

- 5.1. Describe the 8086 system I/O interface.
- 5.2. Describe the I/O address space of the 8086 system.

- 5.3. Describe the I/O read and I/O write bus cycle of 8086 microprocessor.
 - 5.4. Define programmable peripheral Interface.
 - 5.5. Mention the commonly used support chips and purpose of those.
 - 5.6. Describe the operation of PPI with block diagram.
 - 5.7. Configure the control word of the control register of PPI for simple I/O operations.
- 6. Understand the interrupt interface of the 8086 microprocessor.**
- 6.1. Mention the types of interrupts.
 - 6.2. Describe the common features of different types of interrupts.
 - 6.3. Sketch the map of interrupt vector table.
 - 6.4. Describe the external hardware interrupt interface of the 8086 microprocessor.
- 7. Understand the assembly language programming of 8086 family.**
- 7.1. Define the assembler pseudo instructions.
 - 7.2. Describe the use of assembler directives (i. e. SEGMENT, ENDS, ASSUME, DUP, etc.)
 - 7.3. Describe the use of program development tools (i.e. editor, assembler, linker, locator debugger and emulator.)
 - 7.4. Explain the sequential, IF-THEN-ELSE, WHILE-DO and REPEAT-UNTILL structure in 8086 assembly language with pseudo code and flow chart.
 - 7.5. Write assembly language programs.
- 8. Understand the features of advanced microprocessors.**
- 8.1. List the names of other x86 family processors including Pentium series and state the brief specification.
 - 8.2. Describe the real and protected mode memory addressing technique.
 - 8.3. State the function of BIST in Pentium processor.
 - 8.4. State multiprocessing and parallel processing.
 - 8.5. Define multi-core processors (i.e. Dual core, Quad core, core ix).
 - 8.6. Write down the advantages of multi-core processors.
- 9. Understand the real world interfacing**
- 9.1. Describe the interfacing of LED Display with program to the microprocessor.
 - 9.2. Describe the interfacing of seven segment LED display with program to the microprocessor.
 - 9.3. Describe the interfacing of Multiple Digit Display with program to the microprocessor.
 - 9.4. Describe the method of interfacing of stepper motor to the microprocessor.

Practical:

1. Perform the task to develop and execute an assembly language program for solving arithmetic problems using 8086/88 μ p trainer or MASM type tools or software simulator.
2. Perform the task to develop and execute an assembly language program for solving logical problems using 8086/88 μ p trainer or MASM type tools or software simulator.

3. Perform the task to develop and execute an assembly language program to compute 1's or 2's complement of binary number using 8086/88 μ p trainer or MASM type tools or software simulator.
4. Perform the task to transmit data from a microprocessor to an I/O using Intel 8086/8088 based microprocessor trainer or MASM type tools or simulator software.
5. Perform the task to receive data from an I/O to the microprocessor using Intel 8086/8088 based microprocessor trainer or MASM type tools or simulator software.
6. Perform the task to develop and execute an assembly language program/ Subroutine to produce time delays of different durations using 8086/88 μ p trainer or MASM type tools or software simulator.
7. Perform the task to develop and execute assembly language programs that implement the branching and looping structures using 8086/88 μ p trainer or MASM type tools or software simulator.
8. Build a simple computer prototype using 8086/8088 processor with memory, I/O interface and simple I/O devices

Reference Books:

1. Digital Computer Electronics - Malvino- Brown
2. Microprocessor And Microcomputer Based System Design - Mohamed Rafiquzzaman..
3. Microprocessors and Interfacing: Programming and Hardware - Douglas V. Hall
4. The Intel Microprocessors - Barry B. Brey
5. Microprocessor & Interfacing - A.P. Godse & D.A. Godse
6. The 8086 and 80286 Microprocessor - Avatar Singh

OBJECTIVES

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

- Fundamentals of microcontroller
- Architecture of 8051 microcontroller.
- Instruction set of the 8051 microcontroller.
- Assembly language programming for the 8051 microcontroller.
- C language program for the 8051 microcontroller.
- I/O por. Timer and Counter of the 8051.
- Serial communication of the 8051 microcontroller.
- Interfacing real world devices.

SHORT DESCRIPTION

Fundamentals of microcontroller, hardware of 8051, instruction set, Assembly language programming, C language programming, Timer, Serial port, Interrupt, DC motor interfacing, Stepper motor interfacing, interfacing Seven Segment LED display, interfacing LCD display, Interfacing GLCD, Interfacing OLED, interfacing ADC & DAC.

DETAIL DESCRIPTION**Theory:****1 Fundamentals of Micro controller.**

- 1.1 *Define Microcontroller and Microprocessor.*
- 1.2 *List the basic building blocks of a Microcontroller.*
- 1.3 *Compare Microprocessor and Microcontroller.*
- 1.4 *Mention the types of Microcontroller.*
- 1.5 *Describe the Harvard and Von-Neumann, CISC and RISC architecture.*
- 1.6 *Mention the criteria for choosing a microcontroller*
- 1.7 *List the field of Microcontroller applications.*

2 Features of the Intel 8051 Microcontroller .

- 2.1 Define microcontroller family.
- 2.2 List the different family of microcontroller and members of 8051 family.
- 2.3 Mention the features of the Intel 8051 microcontroller .
- 2.4 Compare AT89C2051, AT89C4051 and AT89W52 with 8051.

3 Architecture of the Intel 8051 Microcontroller

- 3.1 Describe the simplified Block diagram of the Intel 8051 microcontroller.
- 3.2 Explain the commonly used registers of the 8051 microcontroller.
- 3.3 Describe the memory organization of the 8051 microcontroller .
- 3.4 Explain how to use off-chip memory with the 8051.
- 3.5 State the function of each flag of the PSW register.
- 3.6 Explain the pin and signal of the 8051 microcontroller.
- 3.7 Explain the structure of 8051 I/O ports.
- 3.8 Mention the Alternate function of the ports.
- 3.9 Describe the Clock and Reset circuits of the 8051.

4 Instruction Set of 8051 Microcontroller.

- 4.1 Define Instruction and Instruction set.
- 4.2 Classify the 8051 instruction
- 4.3 Describe the function of each instruction.
- 4.4 Explain the Addressing modes of 8051.

5 The Assembly Language Programming of the Intel 8051 Microcontroller.

- 5.1 Define (i) Assembly language (ii) Assembler and (iii) Linker (iv) IDE.
- 5.2 Mention the fields of an assembly language instruction.
- 5.3 Describe the commonly used Assembler directives.
- 5.4 Mention the steps to create and execute assembly language program.
- 5.5 Identify the files in assembly language program.
- 5.6 Explain the step-by-step action of the 8051 upon applying power on it.
- 5.7 Write simple assembly language program for the 8051.

6 Programming 8051 in C.

- 6.1 Mention the reasons for writing program in C for microcontroller.
- 6.2 List C data types and operators for 8051
- 6.3 Describe creating time delay in C.
- 6.4 Write program in C for accessing port, code memory, serial communication, Timer and interrupt operation.

7 8051 Timer/counter

- 7.1 List the function of a timer.
- 7.2 Discuss the mode of operation of timer.
- 7.3 Describe the function of each bit of TMOD & TCON Register.
- 7.4 Calculate the initial value of timer for creating a certain delay.
- 7.5 Write subroutine for creating delay of certain amount of time using Timer.
- 7.6 Describe the Timer as an event counter.
- 7.7 Develop program for generating square wave and PWM using Assembly and C.

8 8051 Serial communication.

- 8.1 Mention different types of communication in digital System.
- 8.2 List the feature of 8051 serial port.
- 8.3 Describe the block diagram of 8051 serial port.
- 8.4 Explain the serial communication protocol and data framing.
- 8.5 Describe the pin and signals of RS232 DB9 connector.
- 8.6 Describe the pins and structure of line driver(Such as MAX232).
- 8.7 Explain the function of serial port registers.
- 8.8 Describe the modes of serial communication of the 8051.
- 8.9 Explain the procedure of setting Baud rate of serial port.
- 8.10 Write program to transmit and receive data through serial port in c and assembly.

9 Interrupt of the 8051 Microcontroller.

- 9.1 List the source of interrupt of the 8051.
- 9.2 Define Interrupt service routine (ISR).
- 9.3 Mention the interrupt priority and vector locations.
- 9.4 Describe each bit of the interrupt enable (IE) register.
- 9.5 Describe the procedure of enabling and disabling interrupt.
- 9.6 Mention the steps in executing an interrupt.
- 9.7 Describe the register protection during interrupt.
- 9.8 Describe External Hardware, Timer and Serial communication Interrupt.
- 9.9 State the common problem with interrupt.

10 Interfacing Display device

- 10.1 Describe the pin and block diagram of LCD, GLCD and OLED.
- 10.2 Describe the pages, lines and cursor position of LCD, GLCD and OLED.
- 10.3 Describe the interfacing overview of LCD, GLCD and OLED.
- 10.4 Write Program for displaying text and Image on LCD, GLCD and OLED.

11 Interfacing Matrix Keypad and Dot Matrix LED Display

- 11.1 Describe the structure of Dot Matrix Display
- 11.2 Explain the working of the Display
- 11.3 Write Program for displaying Stable and moving character on the Display.
- 11.4 Describe the organization of a matrix Keyboard.
- 11.5 Explain the steps to detect and identify the key pressed.
- 11.6 Write a keyboard subroutine to send the ASCII code for pressed key to a port.

12 Interfacing with real world devices

- 12.1 Describe interfacing the 8051 with a DC motor.
- 12.2 Describe interfacing the 8051 with a stepper motor.
- 12.3 Describe interfacing ADC chips to the 8051.
- 12.4 Describe interfacing the DAC chips to the 8051.
- 12.5 Describe interfacing temperature sensor to the 8051.
- 12.6 Develop program for above interfacing circuits.

Practical:

- 1 **Test a program to transfer the 16 bytes of data from ROM location starting at 30H to RAM location starting 50H.**
 - 1.1 Draw the flow chart.
 - 1.2 Start an IDE .
 - 1.3 Type the program.
 - 1.4 Save the program.
 - 1.5 Compile the program
 - 1.6 Run the Simulator and observe the execution of the program.

- 2 Develop and test a program for flashing LEDs.**
 - 2.1 Draw the Flow chart.
 - 2.2 Type and save the program.
 - 2.3 Compile the program.
 - 2.4 Download the Hex program to 8051 code memory.
 - 2.5 Construct the circuit.
 - 2.6 Power the circuit and observe the output.

- 3 Develop and test a program for displaying 0 to 9 on 7-Segment display.**
 - 3.1 Draw the Flow chart.
 - 3.2 Type and save the program.
 - 3.3 Compile the program.
 - 3.4 Download the Hex program to 8051 code memory.
 - 3.5 Construct the circuit.
 - 3.6 Power the circuit and observe the output.

- 4 Develop and test a program for Interfacing Keyboard.**
 - 4.1 Draw the Flow chart.
 - 4.2 Type and save the program.
 - 4.3 Compile the program.
 - 4.4 Download the Hex program to 8051 code memory.
 - 4.5 Construct the circuit.
 - 4.6 Power the circuit and observe the output.

- 5 Develop and test a program for Interfacing LCD.**
 - 5.1 Draw the Flow chart.
 - 5.2 Type and save the program.
 - 5.3 Compile the program.
 - 5.4 Download the Hex program to 8051 code memory.
 - 5.5 Construct the circuit.
 - 5.6 Power the circuit and observe the output.

- 6 Develop and test a program for Interfacing DC Motor.**
 - 6.1 Draw the Flow chart.
 - 6.2 Type and save the program.
 - 6.3 Compile the program.
 - 6.4 Download the Hex program to 8051 code memory.
 - 6.5 Construct the circuit.
 - 6.6 Power the circuit and observe the output.

- 7 Develop and test a program for Interfacing Stepper Motor.**
 - 7.1 Draw the Flow chart.
 - 7.2 Type and save the program.
 - 7.3 Compile the program.
 - 7.4 Download the Hex program to 8051 code memory.
 - 7.5 Construct the circuit.
 - 7.6 Power the circuit and observe the output.

8 Develop and test a program for Interfacing DAC.

- 8.1 Draw the Flow chart.
- 8.2 Type and save the program.
- 8.3 Compile the program.
- 8.4 Download the Hex program to 8051 code memory.
- 8.5 Construct the circuit.
- 8.6 Power the circuit and observe the output.

9 Develop and test a program for Interfacing ADC.

- 9.1 Draw the Flow chart.
- 9.2 Type and save the program.
- 9.3 Compile the program.
- 9.4 Download the Hex program to 8051 code memory.
- 9.5 Construct the circuit.
- 9.6 Power the circuit and observe the output.

10 Develop and test a program for Interfacing Temperature sensor.

- 10.1 Draw the Flow chart.
- 10.2 Type and save the program.
- 10.3 Compile the program.
- 10.4 Download the Hex program to 8051 code memory.
- 10.5 Construct the circuit.
- 10.6 Power the circuit and observe the output.

11 Develop and test a program for dot matrix display..

- 11.1 Draw the Flow chart.
- 11.2 Type and save the program.
- 11.3 Compile the program.
- 11.4 Download the Hex program to 8051 code memory.
- 11.5 Construct the circuit.
- 11.6 Power the circuit and observe the output.

REFERENCE BOOKS

1. The 8051 Microcontroller and Embedded system _ Mazidi
2. Microcontrollers Theory and Application - Ajay V Deshmukh

AIMS:

To provide the student with an opportunity to acquire knowledge, skill and attitude in the area of Electronic project with special emphasis on:

- Design and construction of Electronic appliances, equipments and systems.
- Developing innovative ideas of students for practical application.
- Improve operation of Electronic equipment through original thinking.

SHORT DESCRIPTION:

Electronic Projects Based on the availability of materials and facilities in the institutes and market. Possible projects may be the improvement of design and construction of Public Address System, Inverter, Solar Power System, Moving message display, Water Level Controller, Robotics arm, IPS, Traffic control System, Digital Temperature indicator, Digital Weight Scale, RF card reader.

Special note:

Students should have to be provided opportunities to select any one of the following Projects

DETAIL DESCRIPTION:

- 1. Design and construct a Public addressing system.**
 - 1.1 Study the catalogue / manuals and other related books / publication.
 - 1.2 Study the pin diagram of ICs.
 - 1.3 Design the circuit of the public address system.
 - 1.4 Draw the circuit diagram.
 - 1.5 List the materials required for the construction.
 - 1.6 Sketch the layout plan for the construction of Public address system.
 - 1.7 Construct the Public address system.
 - 1.8 Construct a case and place the PCB into the case.
 - 1.9 Identify the input / output terminals.
 - 1.10 Connect the microphone, and Speaker.
 - 1.11 Test the performance of the system.
 - 1.12 Analyze the cost of construction.
 - 1.13 Analyze the design and construction.

- 2. Design and Construct an Inverter (DC to AC).**
 - 2.1 Study the related catalogue or manuals.
 - 2.2 Calculate the rating and develop specification.
 - 2.3 Draw the circuit diagram.
 - 2.4 Prepare the required PCB.
 - 2.5 Draw the client diagram on PCB.
 - 2.6 Insert the components on the PCB and solder them.
 - 2.7 Construct a metal case and place the PCB into the case.
 - 2.8 Test the inverter.
 - 2.9 Prepare a report on the project.

3. Design and construct a Solar Power System

- 3.1 Study different manufacturer's literature / catalogue or manuals.
- 3.2 Calculate the output power of the plant and develop the detail specification.
- 3.3 Draw the layout diagram of the solar plant.
- 3.4 Develop the circuit.
- 3.5 Select the materials required for manufacturing the solar plant.
- 3.6 Fix up all the components accordingly.
- 3.7 Analyze the cost of the plant.
- 3.8 Compare per unit production cost with conventional energy plants.
- 3.9 Prepare a report on the project.

4. Design and construct a Moving message Display

- 4.1 Study the related catalogue or manuals.
- 4.2 List the materials required for the Display.
- 4.3 Study the pin diagram of the required ICs.
- 4.4 Draw the circuit diagram.
- 4.5 Prepare the required PCB.
- 4.6 Insert the components on the PCB and solder them.
- 4.7 Construct a case and place the PCB into the case.
- 4.8 Test the circuit.
- 4.9 Prepare a report on the project.

5. Design and construct water level controller.

- 5.1 Study the catalogue / manuals and other related books / publication.
- 5.2 Design the water level controller circuit.
- 5.3 Draw the circuit diagram.
- 5.4 List the materials required for the construction.
- 5.5 Sketch the layout plan for the construction of water level controller.
- 5.6 Construct the water level controller.
- 5.7 Connect the controller with motor and float in water tank.
- 5.8 Test the performance of the controller.

6. Design and construct an IPS.

- 6.1 Study the related catalogue or manuals.
- 6.2 Calculate the rating and develop specification.
- 6.3 Draw the circuit diagram.
- 6.4 List the materials required for the IPS
- 6.5 Prepare the required PCB.
- 6.6 Insert the components on the PCB and solder them.
- 6.7 Construct a case and place the PCB into the case.
- 6.8 Test the IPS.
- 6.9 Prepare a report on the project.

7. Design and construct a Traffic control System .

- 7.1 Select the microcontroller.
- 7.2 Study the pin diagram and architecture of the microcontroller.
- 7.3 Draw the circuit diagram of the traffic control system.

- 7.4 Prepare the required PCB.
 - 7.5 Insert the components (Use IC base) on the PCB and solder them.
 - 7.6 Draw the Flow-chart of the program for the traffic control system.
 - 7.7 Write the program using assembly/C language.
 - 7.8 Convert the program into executable form.
 - 7.9 Transfer the program to the program memory of the microcontroller.
 - 7.10 Construct a case and place the PCB into the case.
 - 7.11 Test the circuit.
 - 7.12 Prepare a report on the project.
- 8. Design and Construct a Digital Temperature Indicator.**
- 8.1 Study the related catalogue or manuals.
 - 8.2 Select the sensor and ICs.
 - 8.3 Study the ICs
 - 8.4 Draw the circuit diagram.
 - 8.5 Prepare the required PCB.
 - 8.6 Insert the components on the PCB and solder them.
 - 8.7 Construct a case and place the PCB into the case.
 - 8.8 Test the temperature indicator.
 - 8.9 Prepare a report on the project.
- 9. Design and Construct a Digital weight Scale.**
- 9.1 Study the related catalogue or manuals.
 - 9.2 Study the pin diagram of the ICs.
 - 9.3 Draw the circuit diagram.
 - 9.4 List the materials required for the project.
 - 9.5 Prepare the required PCB.
 - 9.6 Insert the components on the PCB and solder them.
 - 9.7 Construct a case and place the PCB into the case.
 - 9.8 Test the circuit.
 - 9.9 Prepare a report on the project.
- 10. Design and Construct a RF card reader.**
- 10.1 Study the related catalogue or manuals.
 - 10.2 Study the pin diagram of the ICs.
 - 10.3 Draw the circuit diagram.
 - 10.4 List the materials required for the project.
 - 10.5 Prepare the required PCB.
 - 10.6 Insert the components on the PCB and solder them.
 - 10.7 Construct a case and place the PCB into the case.
 - 10.8 Test the circuit.
 - 10.9 Prepare a report on the project.

REFERENCE BOOKS

1. High Frequency Inverter.....S.K. Gupta.
2. Advance Stabilizer Circuits.....S.K. Gupta
3. IC Voltage Guide.....S.K. Gupta
৪. হবি ইলেকট্রনিক্স, দেবাশিস বন্দ্যোপাধ্যায়
৫. ইলেকট্রনিক্স মডেল বানাও... সন্দীপ সেন
৬. ইনভার্টার তৈরী ও সার্ভিসিং. দেবাশিস বন্দ্যোপাধ্যায়

AIMS

- To be able to develop the working condition in the field of industrial or other organization.
- To be able to understand develop the labor management relation in the industrial sector.
- To be able to develop the management techniques in the process of decision making.
- To be able to manage the problems created by trade union.
- To be able to understand Planning
- To be able to perform the marketing.
- To be able to maintain inventory.

Course Outline

Basic concepts of management; Principles of management; Planning, Organization, Scientific management; Span of supervision; Motivation; Personnel management and human relation; Staffing and manpower planning ; Training of staff; Concept of leadership; Concepts and techniques of decision making; Concept of trade union; Inventory control; Economic lot size ; Break even analysis; Trade Union and industrial dispute, Marketing;

1 Basic concepts & principles of management.

- 1.1 Define management and industrial management.
- 1.2 State the objectives of modern management.
- 1.3 Describe the scope and functions of management.
- 1.4 State the principles of management.
- 1.5 State the activity level of industrial management from top personnel to workmen.
- 1.6 Describe the relation among administration, organization & management.

2. Concept of Planning

- 2.1 Define Planning
- 2.2 Discuss the importance of Planning
- 2.3 Discuss the Types of Planning.
- 2.4 Discuss the steps in Planning

3 . Concepts of organization and organization structure.

- 3.1 Define management organization.
- 3.2 State the elements of management organization.
- 3.3 Describe different forms of organization structure.
- 3.4 Distinguish between line organization and line & staff organization.
- 3.5 Distinguish between line organization and functional organization.
- 3.6 Describe the features, advantages and disadvantages of different organization structure.

4. Concept of scientific management.

- 4.1 Define scientific management.
- 4.2 Discuss the basic principles of scientific management.
- 4.3 Explain the different aspects of scientific management.
- 4.4 Discuss the advantages and disadvantages of scientific management.
- 4.5 Describe the difference between scientific management and traditional management..

5. Concept of span of supervision.

- 5.1 Define span of supervision and optimum span of supervision.
- 5.2 Discuss the considering factors of optimum span of supervision.
- 5.3 Discuss advantages and disadvantages of optimum span of supervision.
- 5.4 Define delegation of authority.
- 5.5 Explain the principles of delegation of authority.
- 5.6 Explain the terms: authority, responsibility and duties.

6 . Concept of motivation.

- 6.1 Define motivation.
- 6.2 Discuss the importance of motivation.
- 6.3 Describe financial and non-financial factors of motivation.
- 6.4 Special Motivational Techniques.

6.5 Discuss the motivation theory of Maslow and Herzberg.

6.6 Differentiate between theory-X and theory-Y.

7. Concept of leadership.

7.1 Define leadership.

7.2 Discuss the importance and necessity of leadership.

7.3 Discuss the functions of leadership.

7.4 Describe the qualities of a leader.

8. Basic concepts and techniques of decision making.

8.1 Define decision making.

8.2 Discuss the importance and necessity of decision making.

8.3 Discuss different types of decision making .

8.4 Describe the steps in decision making.

9 .Concept of personnel management and human relation.

.9.1 Define personnel management.

.9.2 Discuss the functions of personnel management.

9.3 Define staffing.

9.4 Define recruitment and selection of employees.

9.5 Describe various sources of recruitment of employees.

9.6 Describe the methods of selection of employees.

9.7 Define training and orientation of employee.

9.8 Discuss the importance and necessity of training.

9.9 Discuss the various methods of training of workmen, technicians and executive personnel.

10. Concept of inventory control & Economic lot size

10.1 Define inventory.& inventory control.

10.2 Describe the function of inventory control.

10.3 Define Economic lot size and the Method of determination of economic lot size.

10.4 Discuss the effects of over supply and under supply.

10.5 Explain the following terms :

- Bin card or Bin tag.
- Purchase requisition.
- Store requisition.
- Material transfer note.
- First in first out (FIFO).
- Last in first out(LIFO).
- Safety stock
- Lead time

11. Concept of Break Even Point(BEP)

11.1 Define Break Even Point and Break Even Chart.

11.2 Describe the method of determination of BEP

11.3 Explain the terms :

- Break even analysis.
- Fixed cost.
- Variable cost

12 . Concept of Marketing

12.1 Define marketing.

12.2 Discuss the function of marketing.

12.3 State the objectives of marketing.

12.4 Explain the terms :

- Purchase
- Brand
- Producer
- Consumer

- Customer
- Copyright
- Trade mark

12.5 Discuss product life -cycle and marketing strategies in different stages of a product life-cycle

13. Concept of trade union and industrial dispute

13.1 Define trade union.

13.2 Mention the objectives of trade union.

13.3 Discuss the function of trade union.

- 13.4 Describe different types of trade union.
13.5 Define industrial dispute
13.6 Discuss different type of industrial dispute

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