4-YEAR DIPLOMA IN ENGINEERING PROGRAM

ELECTRONICS TECHNOLOGY

SYLLABUS
(COURSE STRUCTURE-2010)

SEVENTH & EIGHTH
SEMESTER

ELECTRONICS TECHNOLOGY (68)

SEVENTH SEMESTER

SL NO	Subject Code	Name of the subjects	T	P	C	Marks				
						Theory		Practical		
						Cont. Assess	Final Exam	Cont. Assess	Final Exam	Total
1.	6871	Microcontroller & Embedded Systems	2	6	4	20	80	50	50	200
2	6872	Computer Control & Robotics	2	3	3	20	80	25	25	150
3	6873	Industrial Control & PLC	3	3	4	30	120	25	25	200
4	6874	Microwave Radar & Navigation Aids	2	3	3	20	80	25	25	150
5	6875	Biomedical Engineering	3	3	4	30	120	25	25	200
6	6876	Electronic Project	0	6	2	00	00	50	50	100
7	5853	Entrepreneurship	2	0	2	20	80	00	00	100
			14	24	22	140	560	200	200	1100

ELECTRONICS TECHNOLOGY (68)

EIGHT SEMESTER

SL NO	Subject Code	Name of the subjects	T	P	C	Marks				
						Theory		Practical		
						Cont. Assess	Final Exam	Cont. Assess	Final Exam	Total
1.	6881	Industrial Training	0	0	6	-	-	180	120	300
		Total								**300**

CONTENTS

SEVENTH SEMESTER

4-YEAR DIPLOMA IN ENGINEERING PROGRAM

ELECTRONICS TECHNOLOGY

SYLLABUS
(COURSE STRUCTURE-2010)

SEVENTH SEMESTER

6871 MICROCONTROLLER AND EMBEDDED SYSTEMS

	T	P	C
	2	6	4

AIMS

To be able to

- Understand the Fundamentals of microcontroller.
- Understand the features of the 8051 microcontroller.
- Understand the architecture of 8051 microcontroller.
- Understand Instruction set of the 8051 microcontroller.
- Develop Assembly language program for the 8051 microcontroller.
- Understand Subroutine.
- Develop C language program for the 8051 microcontroller.
- Understand I/O port Programming.
- Understand the Timer and Counter of the 8051.
- Understand the Serial communication of the 8051 microcontroller.
- Interfacing LCD and keyboard with the 9051.
- 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 ADC & DAC.

DETAIL DESCRIPTION
Theory:

1 Understand the 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 architecture.
 1.6 Compare CISC and RISC.
 1.7 Mention the field of Microcontroller applications.
 1.8 List the commercial Microcontrollers with salient features
 1.9 Mention the criteria for choosing a microcontroller

2 Understand Features of the Intel 8051 Microcontroller and PIC.
 2.1 Define 8051 family.
 2.2 Mention the features of the Intel 8051 microcontroller and PIC.
 2.3 Compare the features of different member of the 8051 family.

3 Understand Architecture of the Intel 8051 Microcontroller
 3.1 Describe the simplified Block diagram of the Intel 8051 microcontroller.
 3.2 Explain the programming model of the 8051 microcontroller.
 3.3 Describe the memory organization of the 8051 microcontroller mentioning the function
   of SFR, Register bank, bit addressable & general purpose RAM.
 3.4 State the function of each flag of the PSW register.
 3.5 Explain the pin and signal of the 8051 microcontroller.
 3.6 Describe the Clock and Reset circuits of the 8051.

3.7 Compare Atmel 89C2051 and 89C4051 with 8051.

4 Understand the 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 Discuss short, absolute and long range.
  4.5 Explain the Addressing modes of 8051.

5 Understand 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 State the meaning of CPU Instruction and Assembler directives.
  5.4 List the commonly used Assembler directives.
  5.5 Mention the steps to create and execute assembly language program.
  5.6 Identify the files in assembly language program.
  5.7 Explain the step-by-step action of the 8051 upon applying power on it.
  5.8 Write simple assembly language program for the 8051.

6 Understand the Subroutine.
  6.1 Define Subroutine.
  6.2 Mention the Advantages of Subroutine.
  6.3 Describe calling and returning from Subroutine.
  6.4 Write Subroutine for creating delay.

7 Understand Programming 8051 in C.
  7.1 Mention the reasons for writing program in C.
  7.2 List C data types and operators for 8051
  7.3 Describe creating time delay in C.
  7.4 Write program in C for sending data to port, Accessing code ROM, Data serialization
      and interrupt operation.

8 Understand I/O port Programming.
  8.1 List the I/O ports of 8051.
  8.2 Mention the purpose of Pull-up resistor.
  8.3 Write code for configuring port for Input.
  8.4 Write program for receiving and sending data through I/O port
  8.5 Describe the alternate functions of Port-3.

9 Understand the 8051 Timer/counter
  9.1 List the function of a timer.
  9.2 Discuss the mode of operation of timer.
  9.3 Describe the function of each bit of TMOD & TCON Register.
  9.4 Write code for setting timer in different mode.
  9.5 Explain the procedure of starting, stopping and controlling timer.
  9.6 Calculate the initial value of timer for creating a certain delay.
  9.7 Write subroutine for creating delay of certain amount of time using Timer.
  9.8 Develop program for generating square wave and PWM .
  9.9 Describe the Timer as an event counter.

10 Understand 8051 Serial communication.
   10.1 Define serial and parallel communication.

10.2 Describe the RS232 9-pin D type connector.
10.3 Describe the pins and connections of line driver(Such as MAX232).
10.4 Describe the function of each bit of SCON register.
10.5 Describe the modes of serial communication of the 8051.
10.6 Describe configuring and setting Baud rate of serial port.
10.7 Mention the purpose of SBUF register.
10.8 Write program to transmit and receive data through serial port.

11 Under Stand the Interrupt of the 8051 Microcontroller.
    11.1 List the source of interrupt of the 8051.
    11.2 Define Interrupt service routine (ISR).
    11.3 Mention the interrupt priority and vector locations.
    11.4 Describe each bit of the interrupt enable (IE) register.
    11.5 Describe the procedure of enabling and disabling interrupt.
    11.6 Mention the steps in executing an interrupt.
    11.7 Describe the register protection during interrupt.
    11.8 Describe External Hardware, Timer and Serial communication Interrupt.
    11.9 State the common problem with interrupt.

12 Under Stand LCD and Keyboard Interfacing.
    12.1 Describe the pin diagram of LCD.
    12.2 Describe the Instruction register, data register and busy flag.
    12.3 List the LCD command codes,
    12.4 Write Program for displaying data to LCD.
    12.5 Describe the organization of a matrix Keyboard.
    12.6 Explain the steps to detect and identify the key pressed.
    12.7 Write a keyboard subroutine to send the ASCII code for pressed key to a port.

13 Understand real world interfacing
    13.1 Describe interfacing the 8051 with a DC motor.
    13.2 Describe interfacing the 8051 with a stepper motor..
    13.3 Describe interfacing ADC chips to the 8051.
    13.4 Describe interfacing the DAC chips to the 8051.
    13.5 Describe interfacing temperature sensor to the 8051.
    13.6 Develop program for above interfacing circuits.
    13.7 Explain how to use off-chip memory with the 8051.
    13.8 Describe interfacing the 8051 with a Dot matrix display.

Practical:
1 Test a program to send a data to port P1 and p2.
    1.1 Draw the flow chart.
    1.2 Start a simulator program.
    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 Test a program to copy 8 bytes of data from RAM location staring at 30H to RAM location starting 50H.
    2.1 Draw the flow chart.
    2.2 Start an IDE .
    2.3 Type the program.

2.4 Save the program.

2.5 Compile the program

2.6 Run the Simulator and observe the execution of the program.

3 Test a program to transfer the 16 bytes of data from ROM location staring at 30H to RAM location starting 50H.

3.1 Draw the flow chart.

3.2 Start an IDE .

3.3 Type the program.

3.4 Save the program.

3.5 Compile the program

3.6 Run the Simulator and observe the execution of the program.

4 Test a Program to find the sum of the values of RAM locations from 50H to 55H. Register A should contain the low byte and R7 the high byte.

4.1 Draw the flow chart.

4.2 Start an IDE .

4.3 Type the program.

4.4 Save the program.

4.5 Compile the program

4.6 Run the Simulator and observe the execution of the program.

5 Test a program to get the vale of x and send x^2 to p2 continuously.

5.1 Draw the flow chart.

5.2 Start an IDE .

5.3 Type the program.

5.4 Save the program.

5.5 Compile the program

5.6 Run the Simulator and observe the execution of the program.

6 Test a program to get Hex data in the range of 00-FFH from the port.

6.1 Draw the flow chart.

6.2 Start an IDE .

6.3 Type the program.

6.4 Draw the Flow chart.

6.5 Type and save the program.

6.6 Compile the program.

6.7 Run the Simulator and observe the execution of the program.

7 Develop and test a program for flashing LEDs.

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 displaying 0 to 9 on 7-Segment display.

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 Generating Square wave.
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 Keyboard.
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 Interfacing LCD.
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.

12 Develop and test a program for Interfacing DC Motor.
12.1 Draw the Flow chart.
12.2 Type and save the program.
12.3 Compile the program.
12.4 Download the Hex program to 8051 code memory.
12.5 Construct the circuit.
12.6 Power the circuit and observe the output.

13 Develop and test a program for Interfacing Stepper Motor.
13.1 Draw the Flow chart.
13.2 Type and save the program.
13.3 Compile the program.
13.4 Download the Hex program to 8051 code memory.
13.5 Construct the circuit.
13.6 Power the circuit and observe the output.

14 Develop and test a program for Interfacing DAC.
14.1 Draw the Flow chart.
14.2 Type and save the program.
14.3 Compile the program.
14.4 Download the Hex program to 8051 code memory.
14.5 Construct the circuit.

14.6 Power the circuit and observe the output.

15 Develop and test a program for Interfacing ADC.
   15.1 Draw the Flow chart.
   15.2 Type and save the program.
   15.3 Compile the program.
   15.4 Download the Hex program to 8051 code memory.
   15.5 Construct the circuit.
   15.6 Power the circuit and observe the output.

16 Develop and test a program for Interfacing Temperature sensor.
   16.1 Draw the Flow chart.
   16.2 Type and save the program.
   16.3 Compile the program.
   16.4 Download the Hex program to 8051 code memory.
   16.5 Construct the circuit.
   16.6 Power the circuit and observe the output.

17 Develop and test a program for dot matrix display..
   17.1 Draw the Flow chart.
   17.2 Type and save the program.
   17.3 Compile the program.
   17.4 Download the Hex program to 8051 code memory.
   17.5 Construct the circuit.
   17.6 Power the circuit and observe the output.

REFERENCE BOOKS
   1. The 8051 Microcontroller and Embedded system   _ Mazidi
   2. The 8051 Microcontroller   _ I. Scott MacKenzie
   3. 8051 Tutorial   _ Donal Heffernan
   4. 8051 Microcontrollers . An Applications-Based Introductio
                                                       _ David Calcutt\
                                                 _ Fred Cowan
                                                 _ Hassan Parchizadeh
   5. Microcontrollers Theory and Application   - Ajay V Deshmukh

6872	COMPUTER CONTROL SYSTEM AND ROBOTICS	T	P	C
		2	3	3

AIMS

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

• Computer control system

• Fuzzy logic controller

• Robotics fundamental

• Robot sensors and actuators

• Computer vision for robotic systems.

SHORT DESCRIPTION

Computer control system, Digital Control system, Threats of Computer system security, Controller; Fuzzy logic controller; Robotics fundamentals; Robots sensors; Robot actuators; Robot system, computer vision systems and Robot specification.

DETAIL DESCRIPTION

Theory:

1. Understand the computer control system.
1.1 Define computer control system.
1.2 Describe computer control system with block diagram.
1.3 Mention different types of computer control system.
1.4 Describe the on-line and off-line computer control system.
1.5 Describe the application of computer control system.
1.6 Explain the techniques of use of personal computer in control system
1.7 Describe the requirement of computer process control.
1.8 Describe the direct digital control system.
1.9 Describe the numerical control system.
1.10 Describe the supervisor control system

2. Understand digital control system.
2.1 Explain modern digital control system.
2.2 Discuss real time control & control stability.
2.3 Discuss basic element of computer control system.
2.4 Describe impulse response system.
2.5 Describe Z & Bilinear transformation.
2.6 Describe direct controller, Combined feedforward controller, Classical state feedback controller design and limitations.
2.7 Describe computer control architecture.
2.8 Mention hardware of computer control system.

3. Understand the Threats of computer system security.
    3.1   Mention threats of computer system security.
    3.2   Explain type of vulnerable for computer network security.
    3.3   Discuss area of security protection.
    3.4   Discuss the uncertainties of security of computer system.
    3.5   Discuss security control system generation.
    3.6   Explain terminal security definition and update.

4. Understand the controller.
    4.1 Define controller.
    4.2 Describe the relay logic control system.
    4.3 Describe the function of motion controller.
    4.4 Describe the hardware of motion controller.
    4.5 Describe adaptive controller.

5. Understand the fuzzy Logic controller.
    5.1 Define the terms: (a) Fuzzy logic (b) Fuzzy predicates (c) Fuzzy set.
    5.2 Describe the block diagram of a fuzzy logic controller.
    5.3 Compare the traditional and fuzzy logic controller.
    5.4 Describe the technique of temperature control in a room using a fuzzy
         logic (one- input system).
    5.5 Describe the fuzzy logic controller that uses two inputs.

6 Understand the fundamental of Robot.
    6.1. Define the term: (a) Robot (b) Robotics (c) program Location (d) Tooling &
         Grippers (e) work cell.
    6.2. Mention the types of robot.
    6.3. Describe the basic components of robot.
    6.4. Discuss robot joints.
    6.5. Describe the base control robot motion.
    6.6. Describe the axes control robot motion.
    6.7. Differentiate low, medium & high Technology robots.
    6.8. Describe the robot reference frame.
    6.9. Describe the robot programming modes.

7 Understand the basic feature of manipulators & controllers.
    7.1. Describe the robot co-ordinates.
    7.2. Describe the wrist rotation.
    7.3. State manipulator drives system.
    7.4. Describe work envelopes.
    7.5. Describe the general feature of controllers.
    7.6. Describe the internal component of a controller with block diagram.
    7.7. Discuss the master control board of controllers.
    7.8. Describe the signal path in the controllers.

8 Understand hydraulic and pneumatic drive system.
    8.1. Define hydraulic& pneumatic system.
    8.2. Describe the principle of hydraulic drive.
    8.3. Describe the hydraulic actuators.
    8.4. Describe the basic component of pneumatic system.

9 Understand robot gears and linkages.
>   9.1. Define the term gear and linkages, gear ratio, gear direction, gear train.
>   9.2. List the gear used in robotic system.
>   9.3. Describe the energy transfer technique from motor to the End Effectors.
>   9.4. Describe the purposes of linkages for transfer of energy.

10 Understand End Effectors.
>   10.1. Describe the function of End Effectors.
>   10.2. Describe the end-of-arm tooling.
>   10.3. Classify the gripper.
>   10.4. Describe the operation of different type of gripper.

11 Understand robotic sensor.
>   11.1. Mention the types of sensor.
>   11.2. Describe the function of contact sensor.
>   11.3. Describe the function of non contact sensor.
>   11.4. Describe the function of proximity sensors.
>   11.5. Describe the function of electromagnetic sensors.
>   11.6. Describe the function of limit switches.
>   11.7. Describe the function of touch sensor.
>   11.8. Describe the function of tactile sensor.
>   11.9. Describe the function of vision sensor.

121 Understand robot specification & application.
>   12.1. Mention the specification of an industrial robot.
>   12.2. Discuss the growth of robot application.
>   12.3. Describe the robot as a cell controller.
>   12.4. Describe the robot as a peripheral device.

PRACTICAL:

1. Perform the work of ON / OFF control by using PC.

2. Perform the work of three step control by using PC.

3. Perform the speed control of DC motor employing variable frequency variable voltage (VVVF) by using PC.

4. Perform the work of control of stepper motor by using PC.

5. Perform the movement control of Robot manipulators.

6. Develop and run program to perform the movement control of Robot manipulators.

REFERENCE BOOKS

1. Robotics an introduction

-        Douglas R. Malcolm, Jr.

2. Introduction to Robotics

-         by Saeed B. Niku.

3. Robotics Engineering Richard

-         by D. Klafter

-         A. Chmiele Wski.

-         B. Michael Negin.

4. Modern Control Technology

-         by Kilian.

5. Control System Engineering

6873   Industrial Control & PLC

	T	P	C
	3	3	4

AIMS:

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

- Relay Logic Control
- Hardware of PLC.
- Ladder diagram elements.
- Ladder diagram Programming

SHORT DESCRIPTION:

Relay Logic Control, Fundamentals of PLC, Input output (I/O) module, memory system and I/O interaction, PLC Ladder diagram Programming, Internal Relay, Jump and Call, Timer Counter, Shift Register, PID Control ,PLC and Networking.

DETAILS DESCRIPTION

Theory:

Understand Relay Logic Control.

Define relay.
Analyze the working principle of electromechanical relay.
State the concept of relay in control process.
Describe the use of relay to implement control logic AND, OR, NOT and Flip-
    Flop.
Explain relay logic ladder diagram.
Mention the limitation of relay logic control.
Mention the advantages of PLC over relay logic in control process.

Understand the Fundamentals of Programmable Logic Controller (PLC).

Define PLC.
Mention the difference between computer and PLC.
2.3   Mention the difference between Microcontroller and PLC.

2.4   List the component that makes up a typical PLC.
Describe the Architecture of PLC.
Mention The configuration of typical PLC

Understand the Input output (I/O) module.

Define I/O Module
Mention the functions of input and output module.
State the meaning of Digital (Discrete) and analog module.
List the analog and digital I/O devices used in PLC.

Describe AC and DC input module circuits.
Describe AC and DC output module circuits.
List specialized modules of PLC.
Describe the centralized and distributed I/O.

Understand the memory system and I/O interaction.

Mention the need for memory system in PLC.
Describe the executive memory and the application memory.
Illustrate the memory map of PLC.
Describe different types of data file.
Describe the relationship between memory position and the I/O terminals.
Describe the setup procedure of PLC.
Explain PLC operation.

Understand the PLC Ladder Diagram Programming.

List the PLC languages defined by International Electrotechnical Commission
       (IEC) .
Define ladder diagram.
Mention the conventions adopted in drawing ladder diagram.
Identify the standard IEC symbol used for input and output devices.
Mention the notation used for I/O address.
Draw the ladder diagram for Logic functions, Latching and multiple outputs.

Understand the Internal Relay (IR) in PLC.

State the meaning of internal relay
Describe the method of using internal relay.
Mention the different way of expressing internal relay address.
State the necessity of battery backup and master control relay.
Describe the One-shot and Set/Rest operation.
Application of Internal relay.

Understand the Jump , Call and Comparator.

Discuss the conditional Jump in ladder diagram.
Describe Jump within Jump.
Describe the use of subroutine in ladder diagram..
Describe functional block.
Discuss the comparator instruction in ladder diagram.
Application of above instruction.

Understand the Timer in PLC.

State the necessity of timer in PLC.
Mention how timer behaves in PLC
Describe the types of timer with symbol.
Solve problem.

Understand the Counter in PLC.

Define Counter.
State the necessity of counter in PLC.
Describe the types of counter with symbol.
Describe counter application.

Understand the PID control system.

Define P, I, D Control system.
Define PID Control system.
Block diagram of PID control system.
Calculation of PID System.
Application of PID control system.

Understand the Shift Register in PLC.

Define register.
State the necessity of shift register in PLC.
Describe the types of shift register with symbol.
Describe shift register application.
Solve problem.

Understand the PLC and Networking.

Define Network.
Mention the topologies of network.
Describe the three levels of network.
Describe the communication (network) module.

Practical:

1. Implementation of Basic Logic Gates Using Ladder diagram.
2. Blinking light.
3. Dc motor Control Using PLC.
4. Temperature Control System Using PLC.
5. Conveyor system Control Using PLC.
6. Bottling Plant Control using PLC.
7. Sorting of Objects for Packaging Using PLC Based Control.
8. Car Parking Control Using PLC.
9. Automatic Traffic Light Control Using PLC.
10. Washing Machine Control Using PLC.
11. Oven Control Using PLC.
12. Water level Control Using PLC.
13. Batch Mixing Operation Control.

1. Modern Control Technology Components and Systems.   _ Kilian
2. Programmable Logic Controllers.   _ W. Bolton
3. Programmable Logic Controllers: Programming Methods and Applications.
                                            _ John R. Hackworth
                                            _ Frederick D. Hackworth, Jr.
4. Basic Instrumentation System & Programmable Logic Controller.
                                            _ Umesh Rathore.

6874 MICROWAVE, RADAR & NAVIGATION AIDS

T P C
2 3 3

AIMS

To provide the students with an opportunity to acquire knowledge, skill and attitude in the area of microwave, radar & navigation aids with special emphasis on:
• microwave components
• wave guides
• microwave tubes
• microwave measurements
• microwave antenna.
• semiconductor microwave devices
• radar system
• radio and navigation aids

SHORT DESCRIPTION

Concept of microwave; Microwave components; Wave guide; Microwave tubes; Microwave measurements; Microwave antenna; Semiconductor microwave devices; Radar; Radar system; Radio aids; Navigation aids.

DETAIL DESCRIPTION

Theory :

1 Understand the concept of microwave.

1.1 Define the term microwave.
1.2 Mention the application of microwave with frequency range.
1.3 List the characteristics of microwave.
1.4 Mention the problems associated with conventional tubes at UHF.
1.5 Describe the characteristics of tubes for ultra high frequency.
1.6 Describe the basic principles of acorn.
1.7 Describe the basic principle of disk seal tube.

2 Understand the features of wave guide.

2.1 Define the term wave guide.
2.2 List advantages of wave guide over coaxial line.
2.3 Mention different modes of a wave guide.
2.4 Describe phase velocity and group velocity in a wave guide.
2.5 Describe the field pattern of TE10, TE20 and TM11 modes.
2.6 Explain the methods of mode excitation in rectangular wave guide.
2.7 Describe behavior, field pattern and disadvantages of circular wave guide.
2.8 State the relationship between cut-off guide & free space wave length.

3 Understand the concept of microwave components.

3.1 Describe the construction and function of basic microwave components, (i) wave guide tees, (ii) magic tee, (iii) isolating device, (iv) adjustable phase shifter, (v) hybrid ring (rat-race), (vi) coupling probes, (vii) coupling loops, (viii) wave guide flanges, (ix) rotating joints, (x) travelling detector, (xi) mode suppressors, (xii) irises, (xiii) tuning posts and screws.
3.2 Describe the working principle of wave meters.
3.3 Describe the working principle of directional couplers.
3.4 Describe the constructions two of isolators and circulators.
3.5 Describe the principle of isolators and circulators.
3.6 Describe the principle of operation of cavity resonator.

4 Understand the features of klystron tube.

    4.1 Describe the construction and operation of two cavity klystron tube.

    4.2 Describe Applegate diagram for klystron amplifier.

    4.3 Describe the construction and operation of multi cavity klystron.

    4.4 Mention the performance and application of multi cavity klystron.

    4.5 Describe the construction and operation of reflex klystron tube.

    4.6 Mention the performance and applications of reflex klystron.

5 Understand the features of magnetron and travelling wave tube.

    5.1 Describe constructional features of cavity magnetron.

    5.2 Describe the mechanism of oscillations in a magnetron.

    5.3 Describe the construction and operation of travelling wave tube.

    5.4 Mention performance, properties and applications of travelling wave tube.

6 Understand the basic concept of microwave measurements.

    6.1 Describe the method of measurements of low microwave power by bolometer and microwave thermocouple.

    6.2 Describe the method of measurement of medium and high microwave power by calorimeter-wattmeter measuring system.

    6.3 Describe the method of measurement of microwave frequency and wavelength.

    6.4 Describe the method of measurement of standard wave ratio.

    6.5 Describe the method of measurement of impedance.

    6.6 Describe the method of measurement of attenuation.

7 Understand the features of microwave antennas.

    7.1 Mention the characteristics of microwave antennas.

    7.2 Describe the construction of horn antennas.

    7.3 Describe the operation of antennas with parabolic reflectors.

    7.4 Describe the function of feed antennas.

    7.5 Describe the operation of cassegrain feed.

    7.6 Describe the operation of dielectric lens antenna.

8 Understand the concept of semi conductor microwave devices.

    8.1 Describe the construction, performance and application of microwave transistor.

    8.2 Describe the construction, operation and characteristic of varactor diode.

    8.3 Describe the basic principle of parametric amplifiers.

    8.4 Describe the constructional features and applications of gun diode.

    8.5 Describe the theory of microwave amplification by stimulated emission of radiation (Maser).

    8.6 Describe the construction and performance of IMPATT (impact avalanche and transit time) and Gun diode.

9 Understand the basic concept of radar.

    9.1 Describe the basic principle of radar.

    9.2 Express the deduction of the radar range equation.

    9.3 Mention the factors influencing maximum range.

    9.4 Mention the effect of noise.

    9.5 Describe power and frequencies used in radar.

    9.6 Mention different types of radar.

9.7 List the special considerations in radar receiver.
9.8 Describe the function of radar display systems.

10 Understand the features of radar system.

10.1 Describe the operation of basic pulsed radar system.
10.2 Describe the working principle of Duplexer.
10.3 Describe the working principle of moving target indicator (MTI).
10.4 Describe the basic principle of tracking radar system and search radar system.
10.5 Describe the working principle of Doppler radar.
10.6 Mention the advantages and limitations of CW Doppler radar.
10.7 Describe the working principle of FM CW radar.
10.8 Describe the radar antenna scanning pattern.

11 Understand the basic concept of radio aids.

11.1 Describe the basic principles of radio direction finding.
11.2 Derive the equation of resultant voltage of a rectangular loop antenna.
11.3 Mention the step for finding the direction by loop antenna.
11.4 Describe the construction and application of loop, modified loop and Adcock antenna.
11.5 Explain the basic principle of very high frequency omni direction range (VOR).
11.6 Describe the operation of distance measuring equipment (DME).

12 Understand the basic concept of navigation aids.

12.1 Describe the operating principle of long range navigation (LORAN) and short range navigation (SORAN).
12.2 Describe the working principle of instrument landing system (ILS).
12.3 Describe the working principle of Ground Control Approach (GCA).
12.4 Describe the basic principle of marker becons and transponders.

Practical :

1 Measure the tuning range of a reflex klystron.

1.1 Select reflex klystron, power supply, klystron mounts detector & necessary meters, equipment and materials.
1.2 Connect the klystron tube and associated components properly.
1.3 Set up the signal detector.
1.4 Switch on the power supply.
1.5 Set the tuning control at minimum.
1.6 Measure the frequency.
1.7 Measure the frequency for the maximum control.
1.8 Determine the tuning range.

2 Measure the VSWR of a microwave signal for a given load.

2.1 Select a micro wave tube (klystron) and require apparatus & materials.
2.2 Connect the klystron, wave guide / slotted line, load and necessary equipment.
2.3 Switch on the power supply.
2.4 Adjust the controls properly.
2.5 Measure the VSWR.

3 Measure the input impedance of a horn antenna.

3.1 Select a horn, VSWR meter, necessary apparatus.

3.2 Set up the apparatus and connect circuits properly.

3.3 Switch on the power supply.

3.4 Make proper adjustment.

3.5 Collect required data.

3.6 Use smith chart to determine the impedance of a horn antenna.

3.7 Use admittance meter to determine input impedance.

4 Study the operation of two cavity klystron amplifier.

4.1 Select a klystron tube and required apparatus & materials.

4.2 Set up the apparatus and connect the circuit properly.

4.3 Switch on the power supply.

4.4 Apply known signal to the input.

4.5 Make necessary adjustment.

4.6 Measure the signal from output.

4.7 Determine amplification.

5 Study the operation of travelling wave tube amplifier.

5.1 Select the tube and required tools & materials.

5.2 Connect the circuits and equipment properly.

5.3 Switch on the power supply.

5.4 Apply known signal to the input.

5.5 Make proper adjustment.

5.6 Observe the output.

5.7 Determine the amplification.

6 Study the operation of magnetron tube oscillator.

6.1 Select the tube, required apparatus and materials.

6.2 Set up the equipment and connect the circuit.

6.3 Switch on the power supply.

6.4 Make proper adjustment.

6.5 Observe the output frequencies.

6.6 Determine the modes of the tube.

7 Measure the klystron frequency by slotted selection method.

7.1 Select klystron supply, mount, isolator, slotted section and required apparatus & materials.

7.2 Connect the circuit and set up equipment properly.

7.3 Switch on the power supply.

7.4 Make necessary adjustment.

7.5 Measure frequency

8 Measure the directivity and coupling of a directional coupler.

8.1 Select klystron supply, mount, isolator, directional coupler and required equipment & materials.

8.2 Set up the apparatus and connect the circuits.

8.3 Switch on the power supply.

8.4 Make proper adjustments.

8.5 Measure the coupling.

8.6 Measure the directivity.

9 Plot the radiation pattern of horn antenna in horizontal and vertical plane.

9.1 Select klystron supply, klystron mount, isolator, two horn antenna, wave guide to coaxial adapter etc.

9.2 Set up the apparatus and connect the circuits.

9.3 Switch on the power supplies.

9.4 Make proper adjustment.

9.5 Obtain data for horizontal and vertical plane.

9.6 Plot the radiation pattern.

10 Verify the properties of magic tee.

10.1 Select magic tee and required apparatus.

10.2 Setup the equipment and connect the circuits.

10.3 Switch on the power supply.

10.4 Make proper adjustment.

10.5 Observe the magic tee.

11 Study the characteristics of a parabolic dish antenna.

11.1 Select a dish antenna and required apparatus.

11.2 Set up the equipment and connect the circuits.

11.3 Switch on the power supply.

11.4 Collect the data.

11.5 Determine radiation pattern.

12 Study the operation of pulse radar.

12.1 Select the apparatus and required materials.

12.2 Set up the equipment and connect the circuits.

12.3 Switch on the power supply.

12.4 Rotate the antenna to a target.

12.5 Transmits the pulse.

12.6 Receive the echo pulse.

12.7 Determine the angle and distance.

13 Study the operation of an instrumental landing system.

13.1 Select an aircraft landing station.

13.2 Observe the run way localizer.

13.3 Observe the guide path equipment.

13.4 Observe the marker beacons.

13.5 Observe the operation of controlling equipment.

14 Study the operation of a semi conductor micro wave device.

14.1 Select the micro wave semi conductor PIN diode, required apparatus & materials.

14.2 Set up the equipment and connect the equipment.

14.3 Switch on the power supply.

14.4 Make proper adjustments.

14.5 Observe the output frequencies.

* Visit nearest microwave, radar and navigation station and prepare a report.

REFERENCE BOOKS

1. Microwave Engineering
– Sanyeeva Gupta
2. Network Filters and transmission Lines
  - R. P. Jain
3. Principles of Communication Engineering
– Anokh Singh
4. Radio Engineering
– M. L. Gupta
5. Communication System
– Kennedy

6875	BIOMEDICAL ENGINEERING	T	P	C
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6.1.1 AIMS

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

- electrocardiography
- human respiratory system and anesthesia
- medical laboratory and its equipments
- cardiac devices.
- Hemodialysis system
- ultrasound imaging
- radiographic imaging system
- biomedical measuring instruments.

6.2 SHORT DESCRIPTION

Medical terminology; Electrocardiography; Measurement of blood pressure; Blood flow; Human respiratory system and anesthesia, Medical laboratory instruments; cardiac devises, Hemodialysis machine, Ultrasound imaging, Radiographic imaging machine, biomedical measuring instruments .

6.2.1.1 DETAIL DESCRIPTION

Theory :

1   Understand the concept of medical terminology.

   1.1   Describe the cell physiology.

   1.2   List the different major systems with organs of a human body.

   1.3   Describe resting and action potential.

   1.4   Describe the process of excitation and rhythmicity.

   1.5   Explain rhythmic excitation of heart.

2   Understand the concept of electrocardiography and electroencephalography.

2.1   Describe the waveform of electrocardiography (ECG).

2.2   Describe the principle of operation of ECG machine.

2.3   Mention the process of maintenance of ECG machine.

2.4   Mention the characteristic of ECG.

2.5   Describe the operation of online ECG system.

2.6   Describe the operation of ECG telemetry system.

2.7   Define the term electroencephalography (EEG)

2.8   Describe the operation of EEG machine.

3   Understand the concept of measurement of blood pressure & blood Flow.

3.1   List the different methods of blood pressure measurements.

3.2   Describe the operation of systolic-diastolic and mean detector circuits.

3.3   Describe the basic principle of magnetic blood flow meter.

3.4   Describe the operation of ultrasonic blood flow meter.

3.5   Describe the method of plethysmograph.

3.6   Define the term Phonocardiograph.

3.7   State the operation of fiber optic oximeter.

4   Understand the concept of human respiratory and anesthesia system.

4.1   Describe the human respiratory system.

4.2   Describe the function of impedance Pheumograph.

4.3   Describe the operation of Spirometer.

4.4   Describe the terms inhalators, ventilators and respirators.

4.5   Define the term anesthesia.

4.6   Describe the stages of anesthesia.

5   Understanding the concept of medical laboratory & laboratory equipments.

5.1   Describe the function of a catheterization Lab.

5.2   Describe the function of colorimeter.

5.3   Describe the function of autoanalyzer.

5.4   Describe the operation of pulse beat monitor.

5.5   Describe the operation of ultrasonic nebulizer machine.

5.6   Describe the operation of electronic microscope.

5.7   Describe principle and operation of coulter counter and picoscale blood cell counter.

6   Understand the instruments used for surgery

6.1   List different types of surgery.

6.2   Describe the sterilization process.

6.3   List different types of operating room equipment.

6.4   State the principle of surgical diathermy.

6.5   Describe essential features and stage of electro surgery.

6.6   Describe the operation of diathermy machine with block diagram.

6.7   Application of the Laser in diagnosis and therapeutic purpose.

7   Understand the cardiac device.

7.1   Define synchronous and asynchronous cardiac pacemaker.

7.2   Describe the function of a demand-type synchronous pacemaker with block diagram.

7.3   Describe the operation of atrial – synchronous cardiac pacemaker with block diagram.

7.4   Describe the principle of rate responsive pacing.

7.5   Describe different types of power source for implantable pacemaker.

7.6   Define defibrillator and cardioverter.

7.7   Describe the operation of a cardioverter.

7.8   Show connection of oxigenator to bypass the heart.

8   Understand the prosthetic device and stimulator.

8.1   Describe the operation of a transcutaneous RF-power electric stimulator.
8.2   Describe a stimulator system for use on stroke patients suffering form problems associated with drop foot.
8.3   Describe the operation of cochlear prosthesis with block diagram.
8.4   Describe the function of pain suppression and transcutaneous nerve stimulation.
8.5   State Magnetic stimulation

9   Understand the hemodialysis system.

9.1   Describe the function of the kidney system.

9.2   Describe the hemodialysis.

9.3   State the principle of dialysis in the artificial kidney.

9.4   Describe the operation of parallel flow dialyser.

9.5   Describe the constructional details of hollow fibre dialyser.

9.6   Describe the function of portable kidney machine.

9.7   Describe the function of lithotripsy

10   Understand the origin of biopotentials.

10.1   Define the term rheoencephalography.

10.2   Describe the function of electrooculography.

10.3   Describe the function of electroretinograph (ERG).

10.4   Discuss the function of electroencephalography with block diagram.

10.5   Define the term magnetography

10.6   Discuss the function of SQUID for magnetograph

11   Understand the concept of ultrasound imaging.

11.1   Mention the properties of ultrasound.

11.2   Describe the method of production and detection of ultrasound.

11.3   Describe the use of pulse echo technique in ophthalmology and cardiology

11.4   Describe the principle of A-Scan, B-Scan and M-Scan method of pulse echo display.

11.5   Describe the function of echocardiograph.

11.6   Describe the principle of operation of color Doppler ultra sonogram machine.

12   Understand the features of medical imaging system.

12.1   Define the term radiography and tomography.

12.2   Describe the operation of X-ray tube.

12.3   Describe the operation of an X-ray machine with block diagram.

12.4   Describe the operation of a fluoroscopic machine with block diagram.

12.5   Describe the operation of computerized axial tomography (CAT) scanner.

12.6   Define angiography.

12.7   Describe the operation of digital angiography (DSA) unit.

13   Understand nuclear medical imaging system.

13.1   Describe the principle of nuclear medicine system.

13.2   Describe the operation of gamma camera.

13.3   Describe the operation of Reno gram.

13.4   Describe the operating principle of nuclear magnetic resonance (NMR) imaging system.

13.5   Describe the operation magnetic resonance imaging (MRI) machine.

13.6   Describe the operation of single photon emission computerized tomography (SPECT).

13.7   Advantage and disadvantage of CAT, MRI, SPECT.

14   Understand the health physics.

14.1   Define radiation.
14.2   Mention the sources of radiation.
14.3   Describe the units of radiation.
14.4   Describe the nature of radiation.
14.5   Describe the process of measurement of radiation.

14.6   Describe the biological effect of radiation.

14.7   Describe the application of radiation in medical science.

15   Understand the operation of biomedical measuring instruments.

15.1   Describe the phantom / simulator (ECG / other) for calibration of ultrasonogram machine.

15.2   Describe milliampere setting meter for the calibration of x-ray machine.

15.3   Describe dose rate / dosi meter for measuring X-ray rediation.

15.4   Describe digital tachometer for calibration of special motors.

15.5   Describe the principles of measurement of pressure, conductivity and temperature by universal tester.

Practical :

1.   Study the operation of ECG machine.

2.   Study the operation of pulse beat monitor.

3.   Study the characteristics of pace maker / temporary pacemaker.

4.   Study the operation of conventional & digital blood pressure machine.

5.   Study the operation of anesthesia machine.

6.   Identify with different parts and repairing techniques X-ray machine.

7.   Study the operation of X-ray machine with safety precaution.

8.   Study the operation of a fluoroscopic machine.

9.   Study the operation of hemodialysis machine.

10.   Study the operation of ultrasonogram machine.

11.   Study the operation of CAT scanner.

12.   Study the operation of MRI machine.

REFERENCE BOOKS

1.   Introduction to Biomedical Equipment Technology

–   Jogneph J. Carr

John M. Brown

2.   Biomedical Instrumentation and Measurements

–   Leslie Crourwell

Fred J. Weibell

Erich A. Pfeiffer.

3.   Medical Instrumentation application and design

-    John G Webster.

4.   Hand book of Biomedical instrumentation

- Khandpur.

6876   Electronic Project

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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, Water Level Controller, Digital Clock, UPS, IPS, Satellite Home Receiver, Traffic System Controller, Digital Thermometer, Digital Weight Measuring Instrument, Remote Controller, Frequency Counter, IC tester, Radio receiver, Volt Guard, LED message display, Digital Logic Trainer, Stepper Motor Controller. New ideas leading to actual construction will be given more importance.

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
  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 Dynamic Display with the help of NE555 Timer IC**
    4.1   Study the related catalogue or manuals.
    4.2   List the materials required for the Dynamic Display.
    4.3   Study the pin diagram of the NE555 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 a Digital clock using clock IC.**
    6.1   Study the related catalogue or manuals.
    6.2   List the materials required for the clock.
    6.3   Study the pin diagram of the ICs.
    6.4   Draw the circuit diagram.
    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 circuit.
    6.9   Prepare a report on the project.

7. **Design and construct a Digital clock using microcontroller**.
    7.1   Select the microcontroller.
    7.2   Study the pin diagram of the microcontroller.
    7.3   Study the architecture of the microcontroller.
    7.4   Draw the circuit diagram.
    7.5   List the materials required for the clock
    7.6   Prepare the required PCB.

7.7   Insert the components (Use IC base) on the PCB and solder them.
7.8   Draw the Flow-chart of the program for the clock.
7.9   Write the program using assembly/C language.
7.10   Convert the program into executable form.
7.11   Transfer the program to the program memory of the microcontroller.
7.12   Construct a case and place the PCB into the case.
7.13   Test the circuit.
7.14   Prepare a report on the project.

8.   Design and construct the UPS.

8.1   Study the related catalogue or manuals.
8.2   Calculate the rating and develop specification.
8.3   Draw the circuit diagram.
8.4   List the materials required for the UPS
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   Identify the input / output terminals.
8.9   Test the UPS.
8.10   Prepare a report on the project.

9.   Design and construct an IPS.

9.1   Study the related catalogue or manuals.
9.2   Calculate the rating and develop specification.
9.3   Draw the circuit diagram.
9.4   List the materials required for the IPS
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   Identify the input / output terminals.
9.9   Test the IPS.
9.10   Prepare a report on the project.

10.   Design a Satellite Home Receiver.

10.1   Study the related catalogue or manuals.
10.2   Draw the circuit diagram.
10.3   List the materials required for the circuit.
10.4   Prepare the required PCBs.
10.5   Insert the components on the PCBs and solder them.
10.6   Construct a case and place the PCB into the case.
10.7   Identify the input / output terminals.
10.8   Test the performance of the Satellite Home Receiver.
10.9   Prepare a report on the project.

11.   Design and construct a Traffic System Controller.

11.1   Select the microcontroller.
11.2   Study the pin diagram and architecture of the microcontroller.
11.3   Draw the circuit diagram of the traffic control system.
11.4   Prepare the required PCB.
11.5   Insert the components (Use IC base) on the PCB and solder them.
11.6   Draw the Flow-chart of the program for the traffic control system.

11.7   Write the program using assembly/C language.
11.8   Convert the program into executable form.
11.9   Transfer the program to the program memory of the microcontroller.
11.10   Construct a case and place the PCB into the case.
11.11   Test the circuit.
11.12   Prepare a report on the project.

12.   Design and Construct a Digital Thermometer.
12.1   Study the related catalogue or manuals.
12.2   Select the sensor and ICs.
12.3   Study the ICs
12.4   Draw the circuit diagram.
12.5   Prepare the required PCB.
12.6   Insert the components on the PCB and solder them.
12.7   Construct a case and place the PCB into the case.
12.8   Test the Digital thermometer.
12.9   Prepare a report on the project.

13.   Design and Construct a Digital weight measuring instrument.
13.1   Study the related catalogue or manuals.
13.2   Study the pin diagram of the ICs.
13.3   Draw the circuit diagram.
13.4   List the materials required for the project.
13.5   Prepare the required PCB.
13.6   Insert the components on the PCB and solder them.
13.7   Construct a case and place the PCB into the case.
13.8   Test the circuit.
13.9   Prepare a report on the project.

14.   Design and Construct a Multi channel remote control system.
14.1   Study the related catalogue or manuals.
14.2   Study the pin diagram of the ICs.
14.3   Draw the circuit diagram.
14.4   List the materials required for the remote controller.
14.5   Prepare the required PCB.
14.6   Insert the components on the PCB and solder them.
14.7   Construct a case and place the PCB into the case.
14.8   Test the circuit.
14.9   Prepare a report on the project.

15.   Design and Construct a Digital frequency counter.
15.1   Study the related catalogue or manuals.
15.2   List the materials required for the Frequency counter.
15.3   Study the pin diagram of the ICs.
15.4   Draw the circuit diagram.
15.5   Prepare the required PCB.
15.6   Insert the components on the PCB and solder them.
15.7   Construct a case and place the PCB into the case.
15.8   Test the circuit.
15.9   Prepare a report on the project.

16.   Design and Construct a LED moving message display.

16.1   Select the microcontroller.
16.2   Study the pin diagram and architecture of the microcontroller.
16.3   Draw the circuit diagram of the traffic control system.
16.4   Prepare the required PCB.
16.5   Insert the components on the PCB and solder them.
16.6   Draw the Flow-chart of the program for the traffic control system.
16.7   Write the program using assembly/C language.
16.8   Convert the program into executable form.
16.9   Transfer the program to the program memory of the microcontroller.
16.10 Construct a case and place the PCB into the case.
16.11 Test the circuit.
16.12 Prepare a report on the project.

17.   Design and Construct of the Movie display with animation.

17.1   Select the microcontroller.
17.2   Study the pin diagram and architecture of the microcontroller.
17.3   Draw the circuit diagram of the traffic control system.
17.4   Prepare the required PCB.
17.5   Insert the components on the PCB and solder them.
17.6   Draw the Flow-chart of the program for the traffic control system.
17.7   Write the program using assembly/C language.
17.8   Convert the program into executable form.
17.9   Transfer the program to the program memory of the microcontroller.
17.10 Construct a case and place the PCB into the case.
17.11 Test the circuit.
17.12 Prepare a report on the project.

18.   Design and Construct a Digital Logic Trainer.

18.1   Study the related catalogue or manuals.
18.2   Calculate the rating and develop specification.
18.3   Draw the circuit diagram for power and clock circuit.
18.4   List the materials required for the trainer.
18.5   Prepare the required PCB.
18.6   Insert the components on the PCB and solder them.
18.7   Insert LEDs and switches for data and solder them.
18.8   Construct a case and place the PCB & bread boards into the case.
18.9   Prepare a report on the project.

19.   Design and Construct a Power project board.

19.1   Study the related catalogue or manuals.
19.2   Calculate the rating and develop specification.
19.3   Draw the circuit diagram.
19.4   List the materials required for the power project board .
19.5   Prepare the required PCB.
19.6   Insert the components on the PCB and solder them.
19.7   Construct a case and place the PCB & bread boards into the case.
19.8   Prepare a report on the project.

20.   Design and Construct an IC Tester.

20.1   Study the related catalogue or manuals.
20.2   List the materials required for IC Tester.

20.3   Study the required ICs.
20.4   Draw the circuit diagram.
20.5   Prepare the required PCB.
20.6   Insert the components on the PCB and solder them.
20.7   Construct a case and place the PCB & bread boards into the case.
20.8   Test the IC Tester
20.9   Prepare a report on the project.

21.   Design and Construct a Volt Guard (over & under voltage protection circuit).

21.1   Study the related catalogue or manuals.
21.2   Study the required ICs.
21.3   Draw the circuit diagram.
21.4   List the materials required for the project.
21.5   Prepare the required PCB.
21.6   Insert the components on the PCB and solder them.
21.7   Construct a case and place the PCB & bread boards into the case.
21.8   Test the Volt Guard.
21.9   Prepare a report on the project.

22.   Design and Construct a Stepper Motor control circuit.

22.1   Select the microcontroller.
22.2   Study the pin diagram and architecture of the microcontroller.
22.3   Draw the circuit diagram of control circuit.
22.4   Prepare the required PCB.
22.5   Insert the components (Use IC base) on the PCB and solder them.
22.6   Draw the Flow-chart of the program for the traffic control system.
22.7   Write the program using assembly/C language.
22.8   Convert the program into executable form.
22.9   Transfer the program to the program memory of the microcontroller.
22.10   Construct a case and place the PCB into the case.
22.11   Test the circuit.
22.12   Prepare a report on the project.

6.3 REFERENCE BOOKS

1.   High Frequency Inverter……………….…..S.K. Gupta.
2.   Advance Stabilizer Circuits…………….…..S.K. Gupta
3.   IC Voltage Guide…………………….…..…..S.K. Gupta
4.   নিজে নিজে কর ………………………………..জয়ন্ড়দত্ত
5.   হবি ইলেক্ট্রনিক্স ………………………………… দেবাশিস বন্দ্যোপাধ্যায়
6.   ইলেক্ট্রনিক্স মডেল বানাও ………………………… সন্দীপ সেন
7.   ইনভার্টার তৈরী ও সার্ভিসিং ………………………… দেবাশিস বন্দ্যোপাধ্যায়

5853 **ENTREPRENEURSHIP** **T P C**
2 0 2

AIMS
• To be able to understand the concept of entrepreneurship & entrepreneur.
• To be able to understand the concept of environment for entrepreneurship.
• To be able to understand the sources of venture ideas in Bangladesh.
• To be able to understand the project selection.
• To be able to understand business planning.
• To be able to understand the case study

SHORT DESCRIPTION
Concepts of entrepreneurship & entrepreneur; Entrepreneurship & economic development; Environment for entrepreneurship; Entrepreneurship in the theories of economic growth; Sources of ventures ideas in Bangladesh; Evaluation of venture ideas; Financial planning; Project selection; Self employment; Entrepreneurial motivation; Business plan; Sources of assistance & industrial sanctioning procedure.
Insurance ; case study.
DETAIL DESCRIPTION

6.4 *Theory :*

1 Understand the basic concept of entrepreneurship & entrepreneur.
>   1.1 Define entrepreneurship & entrepreneur.
>   1.2 Discuss the characteristics and qualities of etrepreneur.
>   1.3 Mention the classifacation of entrepreneur.
>   1.4 Discuss the case entrepreneurship and mass entrepreneurship.
>   1.5 Discuss the necessity of entrepreneurship as a career.
>   1.6 Discuss the function of entrepreneur in developing countries.
>   1.7 Discuss the prospect of entrepreneurship development in Bangladesh.

2 Understand the concept of entrepreneurship and economic development.
>   2.1 Define economic development.
>   2.2 Discuss that the economic development is a process.
>   2.3 Describe the entrepreneurship as a factor of economic development.
>   2.4 Discuss the capital accumulation or rate of savings.
>   2.5 Discuss the role of entrepreneur in the technological development and their introduction into production Process.
>   2.6 Discuss the entrepreneur in the discovery of new sources of resources.
>   2.7 Discuss the entrepreneur in the discovery of new product.
>   2.8 Discuss the discovery of new markets.

3 Understand the concept of entrepreneurship in the theories of economic growth.
>   3.1 Define entrepreneurship in the theories of economic growth.
>   3.2 Discuss the theory of need for achievement of Devid MacClelland.
>   3.3 Discuss the Malthusian theory of population and economic growth.
>   3.4 Discuss the labour theory of production and limit to growth.
>   3.5 Discuss the Keynesian theory of employment and output.
>   3.6 Discuss the stage theory of growth.
>   3.7 Discuss the Schumpterian theory of economic development.
>   3.8 Discuss the entrepreneurship motive in economic development.

4 Understand the sources of vanture ideas in Bangladesh.
>   4.1 Define sources of venture ideas in Bangladesh.
>   4.2 Discuss different types of sources of venture ideas in Bangladesh.
>   4.3 Discuss informal sources of venture ideas in Bangladesh.

5 Understand the evaluation of venture ideas.
 5.1 Define evaluation of venture ideas.
 5.2 Discuss the factors that influence the selection of venture ideas.
 5.3 Discuss the evaluating financial aspects of business.
 5.4 Discuss the determinats of the firm size.

6 Understand the concept of project selection and financial planning.
 6.1 Define project.
 6.2 Discuss the idea of project.
 6.3 Describe the guide lines for project ideas.
 6.4 Discuss the sources of project ideas.
 6.5 Discuss the evaluation of project ideas.
 6.6 Describe the technical aspect of project.
 6.7 Define financial planning.
 6.8 Discuss the long term financial plan.
 6.9 Discuss the short term financial plan.

7 Understand the concept of self employment.
 7.1 Define self employment.
 7.2 Describe different types of employment.
 7.3 Describe the importance of business as a profession.
 7.4 Discuss the reasons for success and failure in business.
 7.5 Discuss the self assessment of entrepreneurial qualities.

8 Understand the concept of entrepreneurial motivation.
 8.1 Define entrepreneurial motivation.
 8.2 Discuss the achievement motivation theory.
 8.3 Describe the means of improving achievement motivation.
 8.4 Discuss the background of high need achievement.
 8.5 Describe the problems associated with high need achievement.

9 Understand the business plan and the concept of the environment for entrepreneurship.
 9.1 Define business plan.
 9.2 Describe the importance of business plan.
 9.3 Discuss the contents of business plan.
 9.4 Describe the business plan proforma.
 9.5 Define environment of business.
 9.6 Describe the factors which effect environment on entrepreneurship
 9.7 Discuss the aspects of business environment

10 Understand the concept of sources of assistance & industrial sanctioning procedure.
 10.1 Define sources of assistance.
 10.2 Describe different types of sources of assistance.
 10.3 Describe entrepreneurship development cycle.
 10.4 Discuss the aid of sources.
 10.5 Discuss the industrial policy.
 10.6 Describe the technique of industrial policy.
 10.7 Define foreign aid.

11 Understand the insurance and premium.
11.1 Define insurance and premium
11.2 Describe the essential conditions of insurance contract.

11.3 Discuss various types of insurance.
11.4 Distinguish between life insurance and general insurance.

12 Understand the concept of case studies.
      12.1 Define case study.
      12.2 Discuss the objectives of case study.
      12.3 Describe the method of case analysis.
      12.4 Discuss the importance of case study.
      12.5 Mention the advantages and disadvantages of case study