MAHATMA GANDHI UNIVERSITY, KOTTAYAM

B.Sc. COMPUTER MAINTENANCE
AND
ELECTRONICS

SYLLABUS - THIRD AND FOURTH SEMESTERS

Semester � III				
	Course �Code	**Course Name**	**Contact �Hours**	**Credits**
1	EM3B08	First Core Course � 5� Analog Communications����������������������� (same as �EC3B11)	4	4
2	EM3B10	First Core Course � 6 Analog Electronics������������������������������ (same as �EC3B12)	4	4
3	EM3B11	Second Core Course � 1 Basics of Electrical Technology������	3	2
4	EM3C06	First Complementary Course - 3 ���������(same as �MP3C0l)��������������� �Vector Calculus, Fourier Series and Analytic Geometry	5	4
5	EM3C07	Second Complementary Course - 3 Operating System Concepts	3	3
6	EM3B07	First Core Course Practical - 3 Analog Circuits Lab	3	2
7	EM3B09	First Core Course Practical - 4 Electronic Communication Systems Lab	3	2
		Total	**25**	**21**

EM3B08�� First Core Course -5

ANALOG COMMUNICATIONS
� (same as �EC3B11)

Aim of the course:

����� To get a thorough knowledge of modulation and analog communication techniques

Contact hours��� : 72
Credits������������ ���: 4

Course Outline:

Unit I

Module
I��
������ (8 Hours)

Communication Systems- Modulation � Need for modulation- External noise, Internal noise,�� Noise calculation- Noise Figure, Signal to Noise ratio,
Text book: Electronic Communication Systems� - Kennedy and Davis , pp 2-6, 15-26

Module
II���
���� (14 Hours)

Amplitude Modulation- Frequency spectrum of AM wave � Representation of AM wave, Power relation in AM wave, Generation of AM, Basic requirement, Grid modulated Class C amplifier, Plate modulated Class C Amplifier, Modulated transistor amplifier
Text book: Electronic Communication Systems - Kennedy and Davis, pp 35-52

Module
III��
����������� ���� (14 Hours)

SSB Techniques � Evolution and description of SSB, Separation of Carrier, Separation of unwanted side band- Filter system, Phase shift method, Third method, Extensions of SSB-Pilot carrier systems, ISB and VSB
Text book: Electronic Communication Systems - Kennedy and Davis , pp 57-75

Unit II

Module
IV���
����������� ���� (12 Hours)

Frequency Modulation � Theory of� Frequency and Phase modulation,� Description of system, Mathematical representation of FM, Phase Modulation-inter system comparison, Noise and FM-Noise Triangle, De-emphasis, Pre-emphasis, Forms of interference, Comparison of Wide band and Narrow band FM, Stereo-phonic FM multiplex system
Text book: Electronic Communication Systems� - Kennedy and Davis , pp ��79-84,89-100

Module
V��
���� (12 Hours)

�FM Generation and Detection-Generation of FM � Direct method, Varactor diode modulator- Stabilized reactance modulator- Indirect method, Slope detection, Balanced Slope detector, Phase discriminator, Ratio detector
Text book: Electronic Communication Systems - Kennedy and Davis , pp 100-112, 162-171

Module
VI���
����������������������� ���� (12 Hours)

Radio receivers- Reciever types, TRF superheterodyne� receiver, Sensitivity, Selectivity, Image frequency and its rejection,� double spotting, Separately excited mixer, Self �excited mixer, local oscillator, image frequency and IF amplifiers, AGC- diode detector, AFC
FM receivers � Amplitude limiting, Stereo FM multiplex reception

Text book: Electronic Communication Systems - Kennedy and Davis , pp 118-131,133-141, 149, 158-162, 173-174

Reference Book: *Electronic Communication � Roddy and Coolen- PHI*

EM3B10 ������� First Core Course � 6 ���������

ANALOG ELECTRONICS
(same as EC3B12)

Aim of the course:
To get a thorough knowledge of analog ICs

Contact hours� : 72
Credits���������� ���:� 4

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Course Outline

Unit I

Module 1:
Introduction��
����������� ���� (10 Hours)

Integrated Circuits, Types of ICs, Development of ICs � SSI, MSI, LSI, VLSI packages, IC package types, Pin identification and temperature ranges , Device identification, Power supplies for ICs.

Differential amplifier circuit configurations � DC and AC analysis of Dual input balanced output and Dual input unbalanced output Differential amplifiers.

Module 2: Operational Amplifiers���
����������� ���� (12 Hours)

Block diagram representation of a typical op-amp � schematic symbol - A general purpose IC op amp � IC 741 and its features, Op-Amp parameters - input offset voltage and current, input bias current, differential input resistance, output resistance, output voltage swing, common mode rejection ratio (CMMR), slew rate and gain-bandwidth product,� ideal and practical op-amps � Equivalent circuit of an op-amp, Open-loop op-amp configurations,� Frequency response of an op-amp.

Module 3: Op Amp circuits��
����������������� (14 Hours)

Closed-loop non-inverting and inverting amplifiers � measurement of closed-loop voltage gain, differential input voltage, input resistance, output resistance, bandwidth and total output offset voltage,� Voltage follower, Differential amplifier with one op-amp, two op-amps and three op-amps � measurement of voltage gain, Instrumentation amplifier,� Summing, Scaling and averaging amplifiers � output voltage, Current to voltage and Voltage to current converters, Integrator, Differentiator,� Comparators � Basic comparator, Zero-crossing detector, Schmitt trigger.

Unit II

Module 4: Active filters
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�����������������(12 Hours)

Introduction, Advantages of active filters over passive filters, Types of filters, Frequency response characteristics � Butterworth, Chebychev and Cauer, Order of filters,� First order Butterworth filters - low pass, high pass, band pass - wide band-pass and narrow band-pass filters, band reject -� wide band-reject and narrow band-reject filters, all pass filters, Design of filters.

Module 5: Oscillators��
���������������� (10 Hours)

Oscillators � Principles � Types � Frequency stability, Sine wave oscillators - Phase shift oscillator and Wien bridge oscillator, Design of sine wave oscillators,� Square wave generator, Triangular wave generator, Saw-tooth wave generator, Voltage controlled oscillator - IC 566 .

Module 6: Timers, Phase locked loops and Voltage Regulators�������������� ����������� ���� (14 Hours)

Introduction to 555 timer - Functional diagram, Monostable and Astable operations and applications, PLL � Operating principles, Monolithic PLLs,� 565 PLL, PLL as� frequency multiplier, Voltage Regulators, Types - Fixed voltage regulators, Adjustable voltage regulators, Switching regulators, Special regulators, Three terminal regulator ICs like 78xx , 79xx series and LM317.��

Text Book: *Op Amps and Linear Integrated Circuits by Ramakant A*

������������������ Gayakwad, PHI Pvt Ltd.

Reference Text Books:

1. Integrated Circuits by Botkar

2. Integrated Electronics by� Jacob Millman & C C Halkias (Tata McGraw Hill).
3. Electronic Devices and Circuits by Allan� Mottershed PHI

EM3B11 Second Core Course � 1� �

BASICS OF ELECTRICAL TECHNOLOGY

Aim of the course:

����� To introduce the basic concepts of electricity and magnetism

Contact hours� : 54
Credits������������ �: 2

Course Outline:

Module I : Electricity and
Magnetism�� ������
���� ����������(18 hrs)

Nature of electric current � Ohm�s Law � Series Parallel Circuits

Electric charge � Coulomb�s Law � Electric Field � Field strength � Electric Flux Density � Electric Potential

Capacitor � Capacitance � Parallel Plate Capacitor � Capacitors in series and parallel � Energy stored in a capacitor

Magnetic Field � Laws of Magnetic Force � Magnetic Field Strength � Magnetic Potential � Flux Density � Permeability � Susceptibility � Magneto Motive Force � Magnetic Field Strength � Magnetic Circuits

Electromagnetic induction � Faraday�s Laws � Lenz�s Law � Induced emf � Inductance �������� Self Induction � Mutual Inductance � Inductances in series and parallel � Energy stored in magnetic field

Module II : AC Circuit Analysis��� ��� ���������� ����������(18 hrs)

Alternating current� production � AC Circuits � Series and parallel � Resonance

Three phase system phase sequence � Star and Delta connection � line and phase voltage, �������Star / Delta Conversion, Power in three-phase system

Concept of Generation, Transmission and Distribution of Electricity � Single phase system � Electrical safety

Module III� : AC & DC Machines�� ������ ���� ����������(18 hrs)

Fundamentals of AC machines
Transformer � working principle, construction, EMF equation, Voltage transformation ratio � Losses in a transformer- Efficiency of a transformer �All day efficiency � Auto Transformers.
Alternators � Principle of operation � construction � speed and frequency

Fundamentals of DC machines
Working principle of a DC Generators � Construction - Different types of DC Generators � EMF Equation of a generator
Working principle of DC Motors � significance of back emf � Voltage equation of motor, condition for maximum power � speed of a DC motor.

Text Books:
Module I: A Text-Book of Electrical Technology (Volume I) � B.L. Theraja �(S. Chand & Co.)
Module II, III : A Text-Book of Electrical Technology (Volume II & III) � B.L. Theraja
� (S. Chand & Co.)

Reference Books:

1. Hughes Electrical Technology � Edward Hughes�
2. Basic Electrical Engineering�� � V.N. Mittle (TMH)

EM3C06 ������� First Complementary Course - 3���������

������������ VECTOR CALCULUS, FOURIER SERIES AND ANALYTIC GEOMETRY

(*Common with Mathematics for B.Sc. Programme* MP3C0l)

EM3C07 ������� Second Complementary Course � 3

OPERATING SYSTEM CONCEPTS�����

Aim of the course:

����� To provide an in-depth knowledge of operating system, its functioning and its need in a computer system

Contact hours��� : 54
Credits������������ ���: 3

Course Outline:

Module I�������������������� ����������� Overview��� ���� �����������������(18 hrs)

Introduction: Operating System � Early Systems Simple Monitor, Performance, Multiprogramming Time-sharing, Real-time Systems, Protection, Different Classes of Computers, Multiprocessor Systems�������������������������������������� �����������������������

Operating System Services:� Types of services, The User View, The Operating System View File Systems: File Concept, File Support, Access Methods, Allocation Methods, Directory Systems, File Protection, Implementation Issues�������������

Module II������ ����������������������� Process Management��������������������������������� ��������� ������������(18 hrs)

CPU Scheduling � Review of Multiprogramming Concepts, Scheduling Concepts

Deadlocks � The deadlock problem, deadlock characterization, Resource allocation graph, deadlock prevention, deadlock avoidance, deadlock detection, Recovery from deadlock

Module III������������������ ����������� Storage Management������������������������������������ �������� �������������(18 hrs)

Memory Management: Preliminaries, Bare Machine, Resident Monitor, Swapping, Multiple Partitions, Paging Segmentation, Combined Systems ���

Virtual Memory: Overlays, Demand Paging, Performance of Demand Paging, Page Replacement, Virtual Memory Concepts, Page Replacement Algorithms � FIFO, Optimal replacement, Least Recently used, LRU Approximation ��

Text Book:

1. Operating System Concepts (Second Edition) � James. L. Peterson
   �� Abraham Silberschatz
   �� (Addition Wesley Publishing Co.)

Reference Books:

1. Modern Operating System ���� � �������� Andrew .S. Tanenbaum
2. Operating System������������������ � �������� Galvin and� Silberzchatz

EM3B07�������� First Core Course Practical � 3

ANALOG CIRCUITS LAB

Aim of the course:

To equip the students with the practical knowledge of Amplifiers, Oscillators, Analog ICs and their circuits

Contact Hours: 54
Credits����������� : 2

List of Experiments

1. Halfwave rectifier / Fullwave rectifier - Center tapped
2. Bridge Rectifier (with and without C filter)
3. Zener Voltage Regulator
4. Clipping circuits
5. Clamping circuits
6. Single Stage RC coupled BJT Amplifier
7. FET CS Amplifier
8. RC Phase shift Oscillator
9. Astable Multivibrator using BJT
10. Sweep Circuit Using BJT
11. Measurement of 741 Op-amp parameters- Offset Voltage, CMRR� and Slew Rate
12. Inverting And Non Inverting Amplifier
13. Summing And Difference Amplifier
14. Integrating And Differentiating Amplifier
15. Active Filters- First-order Low Pass Filter, First-order High Pass Filter, First-order Wide Band Pass Filter, Narrow Band Reject Filter
16. Wien Bridge Oscillator
17. Square Wave And Triangular Wave Generators
18. 555 IC � Astable Multivibrator
19. Comparators � Inverting And Non inverting
20. Schmitt Trigger

EM3B09�������� First Core Course Practical � 4

ELECTRONIC COMMUNICATION SYSTEMS LAB

Aim of the course:

To equip the students with the practical knowledge of circuits used in the electronic communication field

Contact Hours: 54
Credits����������� : 2

1. AM Generation
2. AM Demodulation

3. Mixer
4. FM modulation using NE566 IC
5. FM� Demodulation
6. Hartley Oscillator
7. Colpitts oscillator
8. Pulse Amplitude Modulator(PAM)
9. Pulse Width Modulator(PWM)
10. Pulse Position modulator(PPM)
11. Second order Low Pass filter
12. Second order High pass Filter
13. Frequency Shift Keying(FSK)
14. Amplitude Shift Keying(ASK)
15. Phase Shift Keying(PSK)
16. Voltage Controlled Oscillator(VCO)
17. Frequency Synthesizer using PLL
18. Time Division Multiplexing(TDM)
19. Error Checking and Correcting Codes
20. Adjustable Logic Delay
21. CDMA Spreader/Despreader
22. All Pass Filter
23. Voltage Limiter
24. Voltage-to-Current Converter
25. Current-to-Voltage Converter

Semester - IV

	Course �Code	**Course Name**	**Contact Hours**	**Credits**
1	EM4B12	First Core Course � 7 Instrumentation Electronics���������������� (same as �EC4B17)	4	4
2	EM4B13	Second Core Course � 2 Fundamentals of Computer Systems	3	3
3	EM4B14	Second Core Course � 3 Microprocessor Architecture, Programming and Applications	3	3
4	EM4C08	First Complementary Course - 4 ��������(same as �MP4C0l)��������������� � Differential Equations, Group Theory and Legendre Polynomial	5	4
5	EM4C09	Second Complementary Course - 4 Computer Organization	3	3
6	EM4B15	Second Core Course Practical - 1 Intel 8085 Assembly Language Programming Lab	4	2
7	EM4B16	On the Job Training	3	1
		Total	**25**	**20**

EM4B12�������� � First Core Course � 7

INSTRUMENTATION ELECTRONICS��� (same as EC4B17)

Aim of the course:
This course aims to impart an in-depth knowledge in the field of transducers, bridges, and electronic instruments.

Contact hours: 72 hours
Credits����������� : 4

Course Outline

Unit- I

Module I - Introduction���
����������� ������ (6 Hours)

Generalized Measurement systems - Static and dynamic characteristics - units and standards of measurements - error analysis.

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Module II - Transducers��
����������� ���� (18 Hours)

Classification of transducers - Selecting a transducer-� Resistive, inductive and capacitive transducers - strain gauge and gauge factor, Temperature transducers - Thermistor, Thermo couples, LVDT, Displacement� Transducers, Piezo-Electric transducers�

Module III-Signal Conditioning ��
����������� �����(12 Hours)

Bridge measurements � Wheatstone Bridge, Maxwell, Hay, Schering, and Wien bridge,� Amplifiers - Chopper amplifiers�������

Module IV- Data Acquisition and conversion��
����������������� (12 Hours)

Principle of operation of� DAC- Weighted resistor network- Binary Ladder � resolution- linearity offset-principle of operation of ADC- counter method, successive approximation, single slope and dual slope integration

Module �V Electronic Measurements and Display Instruments� `����������� ����������� ���� (12 Hours)

DC Voltmeter-DC Ammeter, Analog Multimeter, Digital Multimeter � Block reperesentation- Simple frequency Counter, Q meter � Basic Q meter circuit �Cathode ray Oscilloscopes - block schematic - special oscilloscopes - Storage oscilloscope, Graphic recorder and X-Y recorders.

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Module VI Signal Generators and Analyzers ���
����������� �����(12 Hours)

Signal generators, RF signal generators, Sweep Frequency generators, Pulse generators, Simple frequency counter, Wave analyzer, Harmonic distortion analyzer, Spectrum analyzer. ���������������

Text Books:

1. *Albert D.Helfrick and William D.Cooper - Modern Electronic Instrumentation��*
   ��� and Measurement Techniques, Prentice Hall of India, 2003.
2. *Electronic Instrumentation � H S Kalsi - TMH*

Reference Text Books:

1. *Alan. S. Morris, Principles of Measurements and Instrumentation, Prentice��*
   ��� Hall of India, 2nd edn., 2003.

EM4B13� ��Second Core Course � 2���

FUNDAMENTALS OF COMPUTER SYSTEMS

Aim of the course:
This course aims to impart detailed knowledge on the functional hardware units of the computer

Contact hours: 54 hours
Credits���������� �: 3

Course Outline

Module I�������� ����������� Introduction to Computers�� ������ ���(18 hrs)

History of Computers, Types and Generation of computers-micro, mini, main frame and super computers

Basic components of a digital computer (Block Diagram Explanation)

CPU � Basic components of� CPU � ALU, Control Unit, Registers, Clock Speed, �������������������Math Co-processor, internal math coprocessor

Memory: �������� RAM � SRAM, DRAM., EDO DRAM, SDRAM, RDRAM

����������� ���� ������ ROM � Mask ROM, EPROM, EEPROM, EAROM, Flash RAM, CMOS

Physical Memory Organization � DIP, SIMM, DIMM, SIPP, memory speed, memory capacity of the motherboard

Power supplies � SMPS, UPS

Module II�� ���������������� Storage Devices���
��������� (18 hrs)

Hard Disk � HDD components � disk platter, Read/Write Head, head arm/head slider, spindle motor, logic board, air filter, head actuator mechanism

Disk Geometry �Sides or heads, track, cylinder, sectors

Disk Recording � Data Recording Method, Writing on and Reading from a magnetic disk

Data Encoding Methods � FM, MFM and RLL encoding scheme, Interleave, Skew

Hard disk Interfacing � IDE, SCSI controllers

Hard Disk Formatting � Low level and high level formatting

Other Secondary storage devices- Floppy Disks, CD-ROM, CD-R, CD-RW, DVD

Expansion Bus/Slots � 8 bit ISA, EISA, Local Bus (VL Bus), PCI, AGP

ROM BIOS and Boot up Process � BIOS, POST, Disk Booting

Module III� ���������������� Input / Output Devices and Motherboard� ������������������������ ����������(18 hrs)

Input/ Output Devices � Working of keyboard, mouse, joystick and track ball

Display Devices � working of monochrome and colour CRT, LCD Panel

Printer � Working of Dot Matrix, Laser, Inkjet, colour thermal and dye sublimation colour printers

Scanner � Flat bed, Sheet-fed and Hand-held scanners

Video Basics � Display Adaptor, memory and video subsystem, creating screen image, video display modes, Display resolution, use of colour

Motherboard � CPU Socket, Add-in Card bus slots for ISA, EISA, PCI, AGP, Memory and secondary cache sockets or chips, ROM BIOS and BIOS CMOS. Mother board clock, Back Plane I/O Ports for serial, parallel, mouse and keyboard ports, USB, On Board connectors for power, IDE bus, SCSI, Floppy, Battery

Text Books:

1. Module I�� -���������� Introduction to Computers- Peter Norton (TMH)
   Peter Norton�s guide to upgrading and repairing PCs � Peter Norton
   (Tech Media)
2. Module II� -���������� Modern all About Hard Disk Drive � Lotia/Nair (BPB)
3. Module III����������� -���������� Modern all About Printers � Lotia/Nair (BPB)
   Modern all About MotherBoard � Lotia/Nair (BPB)
   ����������������������������� The Complete Reference PC Hardware� Zacker, Rourke (TMH)
   �������� ��������������������� Hardware Bible�Winn L. Rosch (QUE)

Reference Books:

1. How a computer works � Ron White (QUE)
2. The New Peter Norton�s Programming and Repairing PCs � Peter Norton (BPB)

EM4B14�������� Second Core Course � 3

MICROPROCESSOR ARCHITECTURE, PROGRAMMING AND APPLICATIONS ������������

Aim of the course:

This course aims to give a strong background about microprocessor Intel 8085 and to develop skill in assembly level programming

Contact hours: 54

Credits���������� : 3�������

Course outline

Module I�� �� ����������(18 hrs)

Microprocessor Architecture and its operations, Memory, Input/ Output devices, Example of a microcomputer system, Logic devices for interfacing

Intel 8085 Microprocessor - Architecture and memory interfacing, SDK-85 memory system

Interfacing I/O Devices- basic interfacing concepts, interfacing output displays, interfacing input devices, memory-mapped I/O and peripheral I/O

Module II������ ��� ��������� (18 hrs)

The 8085 programming model, Instruction classification, Instruction, Data format and storage, Overview of Intel 8085 Instruction set

Intel 8085 Instructions- data transfer/copy operations, arithmetic operations, logic operations, branch operations, Writing assembly language programs, Debugging a program

Programming Techniques � Looping, Counting and Indexing, Additional data transfer and 16-bit arithmetic instructions, arithmetic operations related to memory, logic operations - rotate, compare, Dynamic debugging

Module III��� ��������� (18 hrs)

Counters and Time Delays � illustrative programs � hexadecimal counter, modulo-ten counter, illustrative program for generating pulse waveforms, debugging counter and time delay programs

Stack and Subroutines, conditional call and return instructions, advanced subroutine concepts

The Intel 8085 Interrupts- vectored interrupts, restart as software instructions, additional I/O concepts and processes

Basic concepts in serial I/O, software-controlled asynchronous serial I/O, the Intel 8085 �Serial I/O lines � SOD and SID, hardware-controlled serial I/O using programmable chips

Text Book:
Microprocessor Architecture, Programming and Applications � ������ Ramesh S. Gaonkar
���� ������ (Penram International)

Reference Books:
1. Fundamentals of Microprocessors and Microcomputers ��� ������ B. Ram
(Dhanpatrai Publications)
2. Introduction to Microprocessors��������������������������������������� �� ������ A.P. Mathur (TMH)

EM4C08�������� First Complementary Course � 4

DIFFERENTIAL EQUATIONS, GROUP THEORY AND LEGENDRE POLYNOMIAL

(***Common with Mathematics for B.Sc. Programme* - MP4C0l**)

EM4C09�������� Second Complementary Course � 4

COMPUTER ORGANIZATION

Aim of the course:

This course aims to give a strong background in the field of Microprocessor 8085 and to expertise in assembly level programming

Contact hours : 54
Credits���������� ��: 3�����
Course outline

Module I�������� Introduction
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����������(18 hrs)

Functional units of a computer � input unit, memory unit, arithmetic and logic unit, output unit, control unit � Basic operational concepts, Bus structures
Computer arithmetic � Adders � serial and parallel adders, Fast adders � carry look ahead adders, Multiplication � Booth algorithm, Division algorithms

Module II������ Processing Unit��� ������
����������������������������� ����������(18 hrs)
Fundamental concepts- register transfers, performing an arithmetic or logic operation, fetching a word from memory, storing a word in memory, Execution of a complete instruction, Branch instructions, Hardwired control, Micro-programmed control

Module III ���� Input /Output and Memory Organization�������������������������� ���� ������
����������(18 hrs)
Input /Output Organization
Accessing I/O devices, Interrupts � Interrupt hardware, Enabling and disabling of Interrupts � Handling multiple devices, Buses � synchronous and asynchronous, Interface circuits-parallel port, serial port
Memory Organization���������
Memory systems � Basic concepts, Internal organization of memory chips, cache memory � mapping functions � direct mapping, associative mapping, set-associative mapping, Memory interleaving � hit rate and miss penalty, Virtual memory �organization, address translation
Text Book:
Computer Organization� ������� ����������� ���������� V. Hamacher� (McGraw Hill)
Reference Book:
Computer System Architecture��������� � ������� M. Morris Mano (Pearson Education)

EM4B15�������� Second Core Course Practical � 1

INTEL 8085 ASSEMBLY LANGUAGE PROGRAMMING LAB

Aim of the course:
To equip the student with a practical knowledge of Intel 8085 microprocessor programming, its interfacing and applications
Contact hours : 72
Credits����������� : 2
List of Experiments

1. Study of architecture of� Intel 8085 microprocessor
2. Data Transfer Experiments
3. Addition of two 8-bit and 16-bit numbers

4. Addition of� N 8-bit numbers
5. Subtraction of� two 8-bit and 16-bit numbers
6. Multiplication of� two 8-bit and 16-bit numbers
7. Division of two 8-bit numbers
8. Odd or Even Number
9. Positive or Negative Number
10. Divisible or not
11. Addition of two 8-bit and 16-bit BCD numbers
12. Subtraction of two BCD numbers
13. Searching of a number
14. Sorting in ascending and descending order
15. Largest and smallest number in a group
16. Multi-byte addition
17. Square root of a number
18. Factorial of a number
19. Hex� Counter
20. Decimal up/down counter
21. Modulo-ten counter
22. Square wave Generator
23. Traffic light Controller
24. Stepper motor Controller
25. DAC and ADC Interfacing

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