Mahatma Gandhi University-Nalgonda

B.Sc Electronics - Syllabus

(under CBCS w.e.f 2016-2017)

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. (ELECTRONICS) CBCS - SYLLABUS
With effective from 2016 – 2017
Paper Titles (Semester Wise) with Credits

YEAR	SEM	Paper [Theory and Practical]	COURSE TYPE	HRS/PER WEEK	CREDITS
FIRST	I SEM	Paper – I : Circuit Analysis	DSC-1	4	4
		Practical – I : Circuit Analysis Lab	DSC-1A	2	1
	II SEM	Paper – II: Electronic Devices	DSC-2	4	4
		Practical – II : Electronic Devices Lab	DSC-2A	2	1
SECOND	III SEM	Paper – III : Analog Circuits	DSC-3	4	4
		Practical – III : Analog Circuits Lab	DSC-3A	2	1
	IV SEM	Paper – IV : Linear Integrated Circuits and Basics of Communication	DSC-4	4	4
		Practical – IV : Linear Integrated Circuits and Basics of Communication Lab	DSC-4A	2	1
THIRD	V SEM	Paper –V : Digital Electronics	DSC-5	3	3
		Practical – V: Digital Electronics Lab	DSC-5A	2	1
		Paper – VI : Elective – I A.8085 Microprocessor and Applications B. Electronic Instrumentation	DSE-1	3	3
		Practical – VI : Elective – I Practical A.8085 Microprocessor and Applications Lab B. Electronic Instrumentation Lab	DSE-1A	2	1
	VI SEM	Paper – VII : Digital Communication	DSC-6	3	3
		Practical – VII : Digital Communication Lab	DSC-6A	2	1
		Paper – VIII: Elective – II A. 8051 Micro Controllers &Applications B. Digital System Design Using VHDL	DSE-2	3	3
		Practical – VIII : Elective – II Practical A. 8051 Micro Controllers &Applications Lab B. Digital System Design Using VHDL Lab	DSE-2A	2	1

Total Number of Credits: 36

DSC: Discipline Specific Course (Core)
DSE: Discipline Specific Elective

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. I Year (Electronics) Semester I-Theory Syllabus
Paper-I : Circuit Analysis

Total number of hours: 60
No of hours per week: 4
Credits: 4

UNIT - I

AC Fundamentals: The sine wave –average and RMS values – The J Operator –Polar and Rectangular forms of complex numbers – Phasor diagram-Complex impedance and admittance.
Kirchhoff's Current and Voltage Laws: Concept of Voltage and current sources-KVL and KCL- application to simple circuits (AC and DC) consisting of resistors and sources – Node voltage analysis and Mesh analysis.

UNIT-II

Network Theorems (DC and AC): Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum power transfer Theorem, Reciprocity Theorem, Milliman's Theorem, Application to simple Networks.

UNIT-III

RC and RL Circuits: Transient Response of RL and RC Circuits with step input, Time constants. Frequency response of RC and RL circuits, Types of filters – Low pass filter and High pass filter- frequency response, passive differentiating circuit and passive integrating circuit.

UNIT-IV

Resonance: RLC Series and parallel resonance circuits –Resonant frequency –Q Factor-Bandwidth-Selectivity.
Cathode Ray Oscilloscope: Cathode Ray Tube (CRT) and its working, electron gun focusing, deflection sensitivity, florescent screen. Measurement of Time period, Frequency, Phase and amplitude.

Text Books:

1) Basic Electronics-Grob 10th edition (TMH)
2) Circuit Analysis-P.Gnanaswam pearson Education.
3) Circuit and Networks-A. Sudhakar & S. Pallri (TMH)
4) Pulse, digital & switching waveforms-Milliman &Taub.
5) Networks, Lines and Fields-John Ryder (PHI)
6) Network theory-Smarajit Ghosh(PHI)

B.Sc. I YEAR, Semester – I Practical
Paper –I: Circuit Analysis Lab

No. of hour per Week: 2

1. Measurement of peak voltage, frequency using CRO.
2. Measurement of phase using CRO.
3. Thevenin's theorem and Norton's theorem – verification.
4. Maximum power transfer theorem – verification.
5. CR circuit – Frequency response - (Low passes and High pass).
6. CR and LR circuits – Differentiation and integration – tracing of waveforms.
7. LCR – Series resonance circuit – frequency response – Determination of f_o, Q and band width.
8. Simulation: i) verification of KVL and KCL.
   ii) Study of network theorems.
   iii) Study of frequency response (LR).

Note: Student has to perform minimum of <u>Six</u> experiments.

Reference Books:

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2) Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. I Year (Electronics) Semester II-Theory Syllabus
Paper-II : Electronic Devices

Total number of hours: 60
No of hours per week: 4
Credits: 4

UNIT- I

PN Junction: Formation of PN junction, Depletion region, Junction capacitance, Diode equation (no derivation) Effect of temperature on reverse saturation current , V - I characteristics and simple applications of i) Junction diode, ii) Zener diode, iii) Tunnel diode and iv) Varactor diode.

UNIT-II

Bipolar Junction Transistor(BJT) : PNP and NPN transistors, current components in BJT, BJT static characteristics (Input and Output) , Early effect , CB , CC , CE configurations of transistor and bias conditions (cut off, active, and saturation regions), CE configuration as two port network, h – parameter model and its equivalent circuit. Determination of h – parameters from the characteristics. Load line analysis (AC and DC). Transistor Biasing – Fixed and self bias.

UNIT- III

Field Effect Transistor (FET): Construction and working of JFET, output and transfer characteristics of FET, Determination of FET parameters. Application of FET as Voltage variable resistor. Advantages of FET over BJT. **MOSFET** : construction and working of enhancement and depletion modes , output and transfer characteristics Application of MOSFET as a switch .
Uni Junction Transistor (UJT): Construction and working of UJT and its Characteristics. Application of UJT as a relaxation oscillator.

UNIT- IV

Silicon Controlled Rectifier (SCR): Construction and working of SCR. Two transistor representation, Characteristics of SCR. Application of SCR for power control.
Photo electronic Devices: Construction and Characteristics of Light Dependent Resistor (LDR), Photo voltaic Cell, Photo diode, Photo transistor and Light Emitting Diode(LED).

Books Recommended:

1) Electronic Devices and circuits-Millman and Halkias,(TMH)
2) Principles of Electronics-V.K.Mehta & Rohit Mehta
3) Electronic Devices and Circuits-Allen Moltershed(PHI)
4) Basic Electronics and Linear Circuits-Bharghava U
5) Electronic Devices and Circuits-Y.N.Bapat
6) Electronic Devices and Circuits-Mithal.
7) Experiments in Electronics-S.V.Subramanyam.

B.Sc. I YEAR, Semester – II Practical
Paper –II: Electronic Devices Lab

No. of hour per Week: 2

1. To draw volt- ampere characteristics of Junction diode and determine the cut – in voltage, forward and reverse resistances.
2. Zener diode V – I Characteristics – Determination of Zener breakdown voltage.
3. Voltage regulator (line and load) using Zener diode.
4. BJT input and output characteristics (CE configuration) and determination of 'h' parameters.
5. FET – Characteristics and determination of FET parameters.
6. UJT characteristics – determination of intrinsic standoff ratio.
7. UJT as relaxation oscillator.
8. Characteristics of LDR/Photo diode/Photo transistor/Solar cell.

Note: Student has to perform minimum of Six experiments.

Reference Books:

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell - PHI

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. II Year (Electronics) Semester III-Theory Syllabus
Paper-III : Analog Circuits

Total number of hours: 60
No of hours per week: 4
Credits: 4

UNIT – I

Rectifiers and filters: Rectifiers– half wave, full wave and bridge rectifiers, Efficiency, Ripple factor, regulation, harmonic components in rectified output, **Filters** – choke input (inductor) filter, Shunt capacitor filter, L section and π section filters.

UNIT – II

Regulated Power Supplies: Block diagram of regulated power supply, Series and shunt transistor regulated power supplies, three terminal IC regulators (78XX and 79XX), Principle and working of switch mode power supply (SMPS). UPS –Principle and working.

UNIT – III

Transistor amplifier: Classification of amplifiers, Hybrid π model of a transistor, RC coupled CE amplifier – frequency response, analysis.
Feedback in amplifiers: Positive and negative feedback, Effect of negative feedback on gain, bandwidth, noise, input and output impedances. Emitter follower, Darlington pair and its advantages.

UNIT – IV

Oscillators: Barkhausen criterion for sustained oscillations, RC oscillators- RC phase shift and Wien's bridge oscillators, LC oscillators- Hartley and Colpitt's.
Multivibrators: Astable, Monostable and Bistable multivibrators – Qualitative treatment only.

Recommended Books:

1. Electronic Devices and Circuits-Millman and Halkias (TMH)
2. Basic Electronics and linear circuits - Bhargava, Kulshreshta& Gupta TMH
3. A first course in Electronics-AA Khan and KK Dey-PHI
4. Electronic Devices and Circuit Theory-Robert L Boylestad& Louis Nashelsky
5. Pulse, Digital and Switching circuits by Milliman and Taub

B.Sc. II YEAR, Semester – III Practical
Paper –III: Analog Circuits Lab

No. of hours per Week: 2

1. Study of HWR, FWR and bridge rectifier, determination of ripple factor.
2. Series inductor, shunt capacitor, L-section and π-section filters; determination of ripple factor using Full wave Rectifier.
3. Study of voltage regulator using IC's - 78XX & 79XX.
4. Colpitt's oscillator – determination of frequency.
5. RC Phase shift oscillator- determination of frequency
6. Astable multivibrator – determination of time period and duty cycle.
7. **Simulation experiments :**
   i) Rectifiers
   ii) RC coupled amplifier
   iii) Wein's bridge oscillator
   iv) Colpitt's oscillator
   v) RC phase shift oscillator
   vi) Astable multivibrator

Note: Student has to perform minimum of <u>Six</u> experiments

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2) Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. II Year (Electronics) Semester IV-Theory Syllabus
Paper-IV : Linear Integrated Circuits and Basics of Communication

Total number of hours: 60
No of hours per week: 4
Credits: 4

UNIT – I

Operational Amplifiers: Emitter Coupled Differential amplifier, Block diagram of Op.Amp, Characteristics of Op.Amp, Op.Amp parameters-Input resistance, Output resistance, Common mode rejection ratio (CMMR), Slew rate, Offset voltages, Input bias current, Basic Op-Amp circuits - Inverting Op-Amp, Virtual ground, Non-inverting Op-Amp, Frequency response of Op-Amp. Op Amp as: Summing amplifier, subtractor, Comparator, Voltage follower, Integrator, and Differentiator.

UNIT- II

Applications of Op-Amps: Logarithmic amplifier, Sine wave [Wien Bridge] generator and square wave [Astable] generator, Triangular wave generator, Mono stable multivibrator, Solving 0f simple second order differential equations. Basic Op-Amp series regulator and shunt regulator, IC 555 Timer [Block diagram and its working], IC 555 as mono stable and astable multivibrators.

UNIT – III

Modulation: Need for modulation-Types of modulation- Amplitude,, Frequency and Phase modulation.
Amplitude modulation: Analysis of Amplitude modulation, side bands, modulation index, AM modulator, Balanced modulator, Demodulation – diode detector.

UNIT – IV

Frequency modulation: Analysis of FM**.** Working of simple frequency modulator, - detection of FM waves – FM Discriminator. Advantages of frequency modulation. AM and FM Transmitters and radio receivers [block diagram approach]. Introduction to PAM, PPM, PWM, and PCM , Delta modulation.

Reference Books:

1. Op amps and linear Integrated Circuits – Ramakant Gayakwad, PHI
2. Linear Integrated Circuits- D Roy Choudhury and Shail B Jain
3. Electronic Communication Systems-George Kennedy & Bernard Davis
4. Principles of Electronic Communication Systems-Louis E Freznel, TMH

B.Sc. II YEAR, Semester – IV Practical
Paper –IV: Linear Integrated Circuits and Basics of Communication Lab

Number of hours per week: 2

Practical : Using IC 741 OpAmp and IC 555 Timer :

1. Op amp as inverting Amplifier- determination of gain (with AC and DC).
2. Op amp as non- inverting Amplifier- determination of gain (with AC and DC).
3. OP Amp as Summing amplifier and comparator(Zero crossing detector)
4. Astable multivibrator – determination of time period and duty cycle.
5. Monostable multivibrator- determination of gate width.
6. Integrator/ Differentiator – study of wave forms.
7. Astable multivibrator using IC 555
8. Monostable multivibrator using IC 555.
9. AM modulator and detector
10. FM modulator and detector

Simulation of all the above experiments:

1. Inverting and Non inverting amplifiers and comparator
2. Integrator/ Differentiator using op amp
3. Wein's bridge oscillator
4. Astable multivibrator using Op Amp
5. Astable multivibrator using IC 555

Note: Student has to perform minimum of Six experiments

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2) Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. III Year (Electronics) Semester V-Theory Syllabus
Paper-V : Digital Electronics

Total number of hours : 45
No of hours per week: 3
Credits :3

UNIT-I

Number system and Logic gates: Conversions of Binary, octal, Decimal & hexadecimal number systems, Binary addition and subtraction (1's and 2's complement methods).

Logic gates- OR, AND, NOT, XOR, NAND, NOR gates and their Truth tables – Design of basic gates using the Universal gates- NAND and NOR gates, Half adder, Full adder and parallel adder logic circuits. Logic families and their characteristics – TTL, CMOS and ECL logic circuits.

UNIT-II

Boolean algebra and Combinational logic circuits: Boolean algebra- Laws and identities, DeMorgan's Theorems. Simplification of Boolean expressions using Boolean identities- Reduction of Boolean expressions using Karnaugh Maps - Sum of Products (SOP) representation (up to four variables).Multiplexer, De-Multiplexer, Decoder (3 to 8) and Encoder(8 to 3).

UNIT-III

Sequential logic circuits: Flip-flops - SR, D, JK, T and Master-Slave JK ; **Registers** - Shift Registers SISO,SIPO,PISO and PIPO Registers, Universal shift register(IC 7496), **Shift register counters**- Ring counter , Johnson Counter.

UNIT-IV

Counters and Semiconductor memories: 4-bit Asynchronous (Ripple) counter, Modulo-N counter, synchronous counter. Up/down counters –ripple counter IC7493 - Decade counter IC7490 – working, truth tables and timing diagrams.

Semiconductor memories: Organization and working of ROM, types of ROM's - PROM, EPROM,EEPROM, FLASH, RAM- static and dynamic.

Books Recommended:

1. Digital Principles and Applications – Malvino& Leach - TMH.
2. Digital Principles and Applications-Ronald J.Tocci-– Pearson Education.
3. Text book of Electronics Bsc III year (vol.III)-Telugu Akademi
4. Digital Fundamentals – F.Loyd& Jain – Pearson Education.
5. Fundamentals of Digital Circuits – Anand Kumar – PHI
4. Digital Electronics Principles and Integrated circuits – Maini – Wiley India.
5. Digital Electronics - Gothman

B.Sc. III YEAR, Semester – V Practical
Paper –V: Digital Electronics Lab

No. of hour per Week: 2

1. Verification of truth tables of AND, OR, NOT, NAND, NOR, EXOR Gates using IC 74XX series.
2. Construction of basic gates using NAND and NOR gates.
3. Construction of Half Adder using gates. Verification of truth table.
4. Construction of Full Adder using gates and verification of truth table.
5. Verification of truth tables of flip flops: RS, D, and JK using IC's.
6. Construction of binary counters 7493

Simulation experiments:

1. 4bit parallel adder using Full adders.
2. Decade counter using JK flip flops.
3. Up/Down counters using JK flip flops.
4. Up/down counter using 74193
5. Multiplexer/De-Multiplexer.
6. Encoder.

Note: Student has to perform minimum of Six experiments

1. Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2. Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. III Year (Electronics) Semester V-Theory Syllabus
Paper – VI A 8085 Microprocessor and Applications
(DSE- Elective-I)

Total number of hours : 45
No of hours per week: 3
Credits :3

UNIT-I

Introduction to 8085 Microprocessor & its architecture: Introduction to Microcomputer, Intel 8085 Microprocessor – Architecture of 8085 microprocessor – CPU – Timing & Control Unit – Instruction cycle, Fetch Cycle , Execute cycle (Timing diagram), Machine cycle and clock states. Interrupts –Hardware and Software, Address space partitioning – Memory mapped I/O & I/O mapped I/O.

UNIT-II

Instruction set of 8085 microprocessor: Classification - Data transfer operations, Arithmetic operations, logical operations, Branch control operations and stack, I/O and Machine control operations.Stack and Subroutines, Addressing modes

UNIT-III

Programming of 8085 microprocessor: Assembly language programming, addition(8 and 16 bit), 8 bit - subtraction, multiplication and division. Finding the largest and smallest number in data array Program to arrange the given numbers in ascending and descending order. Counters and Time delays.

UNIT-IV

Interfacing of peripherals: Types of programmable and non programmable interfacing peripherals-8212(I/O port)– programmable peripheral interface 8255.
D/A Converters(binary weighted, R-2R ladder network), A/D Converters(Dual slope , Successive approximation), Closed loop and open loop process control systems(concept only), Stepper motor control.

Books Recommended:

1) Microprocessor Architecture and Programming – Ramesh S.Goanker – Penram.
2) Fundamentals of Microprocessors and Micro controllers – B.Ram, - Dhanpat rai & sons.
3) Text book of Electronics B.SC III year (Vol.III)-Telugu Academy.
4) Introduction to Microprocessor – Aditya P.Mathur – TMH.
5) Microprocessor Lab Premier – K.A. Krishnamurthy.

B.Sc. III YEAR , Semester – V Practical
Paper – VIA : 8085 Microprocessor Lab

No. of hours per week :2

I. 8085 – Software Experiments:

1. Binary addition (8 bit and 16 bit) and subtraction (8 bit).
2. Decimal Addition (DAA).
3. Multiplication and Division (8 bit).
4. Picking of largest/Smallest number from the given data.
5. Arranging the given data in ascending/descending order.
6. Time Delay generation.

II. 8085 - Hardware Experiments:

1. R – 2R ladder network (DAC) (4 bits).
2. Interfacing a Stepper motor and rotating it clockwise/anticlockwise direction through a known angle.
3. Interfacing a seven segment display.
4. Interfacing ADC for temperature measurement.

Note: Student has to perform minimum of Six experiments

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. III Year (Electronics) Semester V-Theory Syllabus
Paper – VI B : Electronics Instrumentation
(DSE- Elective-I)

Total number of hours : 45
No of hours per week: 3
Credits :3

Unit – I: Characteristics of an Instrument

Functional elements of a measurement system – Static characteristics – Accuracy, precision, bias, linearity, threshold, resolution, hysteresis, dead space, scale readability, span, static stiffness, input impedance, repeatability and reproducibility - Errors and calculation of errors in overall system –Dynamic characteristics – Zero, first and second order instruments - Responses for step, impulse, ramp and sinusoidal inputs.

Unit –II: Transducers and Sensors

Definition of transducer and sensor – Classification of transducers – Pressure (strain gauge, piezoelectric transducer), displacement (potentiometric, LVDT), temperature (thermometer, thermistor, thermocouple) and photosensitive (Vacuum & gas filled phototubes, photomultiplier, photoconductive cell, photovoltaic cell) transducers.

Unit –III: Bridge Measurements

Introduction - Wheatstone bridge - Kelvin bridge – Guarded Wheatstone bridge - AC bridges and their applications – Maxwell bridge – Hay bridge - Schering bridge - Wien bridge.

Unit – IV: Testing Instruments

Oscilloscopes – Block diagram – CRT Circuits – Vertical and horizontal deflection systems – Delay line, Multiple trace – Probes – Special oscilloscopes.

Books for Study:

1. C. S. Rangan, G. R. Sarma and V. S. V. Mani, 1999, Instrumentation Devices and Systems, Tata McGraw-Hill, New Delhi.
2. A. D. Helfrick and W. D. Copper, 1992, Modern Electronic Instrumentation and Measurement Techniques, Prentice-Hall of India, New Delhi.
3. A. K. Sawhney, A Course in Electrical and Electronic Measurement and Instrumentation, Dhanpat Rai & Sons.

Books for Reference:

1. E. O. Doebelin, 1983, Measurement Systems Application and Design, International Edition, 3rd Ed., McGraw-Hill, NY.
2. D. V. S. Moorthy, 1995, Transducer and Instrumentation, Prentice-Hall of India, New Delhi.
3. J. W. Dalley, W. F. Riley and K. G. Mc Connel, 1993, Instrumentation for Measurements,Wiley, NY.
3. B. C. Nakre and K. K. Chaudry, Instrumentation Measurements and Analysis, Tata McGraw-Hill, New Delhi.
5. D. A. Skoog, Principles of Instrumental Analysis, 3rd Ed., Saunders College Publishing.

B.Sc. III YEAR, Semester – V Practical
Paper – VIB: Electronics Instrumentation Lab

No. of hours per Week: 2

I Analog Experiments:
1. Power control by SCR using UJT.
2. PLL as FM detector (using IC 565).
3. Active high pass filter.
4. Active low pass filter.
5. Calibration of Strain gauge.
6. LVDT.

II Analog Simulation Experiments (S/W):
1) Active filters using Op-Amp.
2) Frequency modulation and detection.
3) Amplitude modulation and detection.
4) Solution of differential equation using analog computation (using TUTSIM).

III Digital Experiments (H/W & S/W)
1. Construction of synchronous Up/Down Counter using IC 74192 and display using 7-segment display.
2. Implementation of Boolean functions using multiplexer.
3. Construction of shift registers using IC7495.
4. Construction of an 8-bit full adder using two 4-bit adders.
5. Given a four variable Boolean function design and simulate the circuit using gates.
6. Simulate a 4-bit binary/BCD decade counter.
7. Simulate a full adder circuit using Decoder/ Demodulator.
8. Simulate a 4-bit shift register.
9. Simulate a Johnson counter.

Note : Minimum 10 experiments to be studied

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. III Year (Electronics) Semester VI-Theory Syllabus
Paper-VII : Digital Communication

Total number of hours: 45
No of hours per week: 3
Credits: 3

Unit -I:
Signals Analysis: Complex Fourier spectrum, Fourier transform, Properties of F.T, sampling theorem, random signals and noise, correlation and power spectrum.

Unit- II:
Digital Communication Systems: A/D and D/A converter, Coded communication, AM, PWM,PPM, PCM, delta modulation, adaptive delta modulation, quantization and noise consideration. Digital Transmission and Reception: Timing, base band systems, ASK, FSK, PSK, QAM.

Unit - III:
Error detection and coding: Parity check, CRC, Hamming distance, Hamming codes, Cyclic codes, line synchronization codes, Manchester code, NRZ coding, Walsh codes.

Unit -IV:
Case studies: Paging system, cellular telephone, global positioning satellite, Facsimile, Videotext.

Reference Books:
1. Analog and Digital Communication systems- M.S. Roden, 3rd Edition, Prentice Hall of India.
2. Modern Digital and Analog Communication Systems-B.P. Lathi.
3. Communication Techniques for digital and Analog signals – M. Kanefsky, John Wiley and Son.
4. Telecommunication – T.H. Brewster, McGraw Hill.
5. Principles of Digital communication, Das, Chatterjee and Mallick, Wiley Eastern Ltd.

B.Sc. III YEAR, Semester – VI Practical
Paper – VII: Digital Communication Lab

No. of hours per Week: 2

I Experiments in Internetworking:

1) Testing of RJ-45 Cable (Straight/ Cross)
2) Introduction to LAN cable and Hub.
3) Verifying physical and logical address.
4) Sending data/ Data transfer from system to system.
5) Concept of HTTP.
6) File transfer FTP.
7) Introduction to server and client.
8) Introduction to network IP address.
9) Identification of NET ID using masks.
10) Mail transfer using SMTP.
11) Encryption (plain text to Hypertext).
12) Study of Router configuration.
13) Study of two networks between LAN and LAN/ MAN and MAN/ WAN and WAN.
14) Introduction to network devices.
15) Static Routing.
16) Basic RIP (observe RIP routers and understand the commands)
17) RIP V2.
18) OSPF (Open Shortest Path First)

II Experiments in Data Communication.

1) Study of serial communication.
2) Study of protocol in communications.
3) Study of Fiber optic communications.
4) Study of wireless communications.
5) Study of parallel communication.

Note : Minimum 10 experiments to be studied

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. III Year (Electronics) Semester VI-Theory Syllabus
Paper – VIII A : 8051 Microcontroller and Applications
(DSE- Elective-II)

Total number of hours: 45
No of hours per week: 3
Credits: 3

UNIT-I

The Microcontroller 8051: Overview and block diagram of 8051. Architecture and pin diagram of 8051. Data types and directives, Memory Organization, register banks and Stack Pointer. PSW Register, other special function registers, I/O port organization. Interrupts and Timer/Counter modules.

UNIT-II

Instruction set of 8051 microcontroller : Classification- Data transfer, Arithmetic, logical, Single Bit,Jump, Loop and CALL instructions and their usage. Addressing modes - Immediate, Register, Direct,Indirect, Absolute addressing, Relative addressing, Indexed Addressing and accessing memory using various addressing modes.

UNIT-III

Programming examples of microcontroller 8051: Addition, Subtraction, division, picking the smallest/largest number among a given set of numbers, arranging a given a set of numbers in ascending/descending order, Subroutines, I/O Programming, Bit manipulation. Accessing a specified port terminal and generating wave forms. Timer/Counter Programming in 8051: Programming 8051 timers- basic registers of timers- Timer0, Timer1 registers. TMOD register, TCON register. Timer modes - Mode1, Mode2 programming. Counter mode programming. Program to generate time delay.

Unit – IV

Serial communications: Serial communication, Types, modes and protocols, Data transfer rates, serial communication program- SBUF and SCON registers, RS232 standards, Programming timer Interrupts.

Applications of Micro controller: Displaying information on a LCD, Interfacing a keyboard, Interfacing a temperature sensor, Interfacing of DAC 0808 to microcontroller, Interfacing of ADC 0804 to microcontroller, Seven segment LED.

Books Recommended:

1) The 8051 Microcontrollers and Embedded Systems – Muhammad AliMazidi and Janice gillipsieMazidi – Pearson Education Asia, 4th Reprint, 2002.
2) Text book of Electonics Bsc III year (vol.III)-Telugu Akademi.
3) Fundamentals of Microprocessors and Microcontrollers – B.Ram.
4) The 8051 Microcontroller – architecture, programming and applications KennthJ. AyalaPenram International Publishing, 1995.
5) Micro controllers-Theory and Applications-Ajay V.Deshmukh.
6) Micro-controller 8051, D. Karuna Sagar, Narosa

B.Sc. III YEAR, Semester – VI Practical
Paper – VIIIA: 8051 Microcontroller and applications Lab

No. of hours per Week: 2

Experiments using 8051 microcontroller:

1. Multiplication of two numbers using MUL command (later using counter method for repeated addition).
2. Division of two numbers using DIV command (later using counter method for repeated subtraction).
3. Pick out the largest/smallest number among a given set of numbers.
4. Arrange the given numbers in ascending/descending order.
5. Generate a specific time delay using timer/counter.
6. Interface ADC and a temperature sensor to measure temperature.
7. Interface DAC and generate a staircase wave form with a step duration and number of steps as variables.
8. Flash a LED connected at a specified out port terminal.
9. Interface stepper motor to rotate clock wise / anti clock wise through a given angle steps.

Experiments with Keil Software:

1. Write a program to pick out largest/smallest number among a given set of number.
2. Write a program to arrange a given set of numbers in ascending/descending order.
3. Write a program to generate a rectangular/square wave form at specified port.
4. Write a program to generate a time delay using timer registers.

Note: Student has to perform minimum of Six Experiments

DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA
B.Sc. III Year (Electronics) Semester VI-Theory Syllabus
Paper – VIII B : Digital System Design Using VHDL

(DSE- Elective-II)

Total number of hours: 45
No of hours per week: 3
Credits: 3

UNIT – I

Fundamental Concepts: Modeling Digital Systems, Domains and Levels of Modeling, Modeling Languages, VHDL Modeling Concepts, Learning a New Language: Lexical Elements and Syntax.

Scalar Data Types and Operations: Constants and Variables, Scalar Types, Type Classification, Attributes of Scalar Types, Expressions and Operators. Sequential Statements: If Statements, Case Statements, Null Statements, Loop Statements, Assertion and Report Statements.

UNIT – II

Composite Data Types and Operations: Arrays, Unconstrained Array Types, Array Operations and Referencing, Records.
Basic Modeling Constructs: Entity Declarations, Architecture Bodies, Behavioral Descriptions, Structural Descriptions, Design Processing. Subprograms: Procedures, Procedure Parameters, Concurrent Procedure Call Statements, Functions, Overloading, Visibility of Declarations.

UNIT – III

Packages and Use Clauses: Package Declarations, Package Bodies, Use Clauses, The Predefined Package Standard.
Resolved Signals: Basic Resolved Signals, IEEE Std_Logic_1164 Resolved Subtypes, Resolved Signals and Ports, Resolved Signal Parameters.

UNIT – IV

Generic Constants: Parameterizing Behavior, Parameterizing Structure. Case Study: A Pipelined **Multiplier Accumulator:** Algorithm Outline, A Behavioral Model, A Register-Transfer-Level Model.

Recommended Books:

1. The Designer's Guide to VHDL -By Peter J. Ashenden, 2nd Ed., 1stIndian Reprint, Harcourt India Pvt. Ltd., 2001.
2. VHDL Programming by Example – By Douglas L. Perry., 4th Ed., TMH., 2002
3. Introductory VHDL : From Simulation to Synthesis –By Sudhakar Yalamanchili., Pearson Education Asia., 2001
4. A VHDL Primer - By J.Bhasker ., Pearson Education Asia, 11th Indian Reprint, 2004
5. Fundamentals of Digital Logic with VHDL Design - By Stephen Brown & ZvonkoVranesic., TMH. 2002
6. Digital Systems Design using VHDL by Charles H.Roth Jr., PWS Pub.,1998
7. VHDL – Analysis & Modeling of Digital Systems – By Zainalabedin Navabi., 2nd Ed., MH., 1998

B.Sc. III YEAR, Semester – VI Practical
Paper – VIII B: Digital System Design Using VHDL Lab

No. of hours per Week: 2

VHDL – Program entry, simulation and Implementation (CPLD/FPGA) using appropriate HDL

Software for the following circuits.

1. All types of logic gates (Data flow).
2. Half Adder (Data Flow, Structural and Schematic).
3. Full Adder (Data Flow, structural and Schematic).
4. Half Subtractor (Data Flow, Structural and Schematic).
5. Full Subtractor (Data Flow, Structural and Schematic).
6. Two control input Mux. Using case.
7. Two control input Mux. Using conditional signal assignment.
8. Two control input Mux. Using selected signal assignment.
9. Two control input Demux. Using case.
10. BCD to seven segment decoder.
11. Modeling a RSFF with assertion, report and different levels of severity (Behavioral).
12. Modeling a BCD counter (Top level behavioral)
13. Writing a test bench for a Half adder.
14. Writing a test bench for a Full adder.

Note: Student has to perform minimum of Six experiments