Veer Narmad South Gujarat University, Surat

Syllabus for T Y B Sc (Electronics) w.e.f June 2013

SEMESTER V: Paper VI

Theory of operational amplifier

Unit I: Differential amplifier

Differential amplifier circuit configurations, Dual input balanced output Differential amplifier, Dual input unbalanced output Differential amplifier, FET Differential amplifier, Constant current bias, Current mirror, cascaded Differential amplifier stages, level translator, examples of designing and analysis

Unit II: Introduction to operational amplifier

Block diagram, equivalent circuit and schematic symbol of typical operational amplifier, ideal op-amp, ideal voltage transfer curve, Open loop op-amp configurations, Voltage series feedback amplifier, voltage shunt feedback amplifier, Differential amplifier with one op-amp, two op-amp and three op-amps, Input offset voltage, input bias current, Total output offset voltage, Noise, CMRR, examples of designing and analysis.

Unit III: Linear applications of op-amp.

Peaking amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier and its applications, voltage to current converter and its applications, current to voltage converter, Integrator, differentiator, examples of designing and analysis

Recommended List of Books:

1) R A Gayakwad, Op-Amps and Linear Integrated Circuits, PHI, New Delhi
2) P R Gray and R G Meyer, Analysis and Design of Integrated Circuits, John Wiley & Sons
3) R F Coughlin and A F F Driscoll, Operational Amplifiers and Linear Integrated Circuits, PHI, New Delhi
4)

List of Experiments/Practicals/Laboratory work for paper VI

1. Study of FET differential amplifier
2. Study of Non- inverting amplifier with PSpice simulation
3. Study of inverting amplifier with PSpice simulation
4. Study of instrumentation amplifier
5. Study of Integrator
6. Study of differentiator

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SEMESTER V : Paper VII

Analog Communication

Unit 1: Introduction

Communication system, Modulation, External Noise, Internal Noise, Signal to noise ratio, Analog and digital signals

Introduction of Antenna, Radiation pattern of an Antenna, Antenna parameters and their definitions, Parasitic Arrays, Horn antennas

Unit 2: Transmission Lines, Wave Propagation and Radiations

Fundamentals of Transmission Line, characteristic impedance, Losses in transmission lines, Standing Waves, Quarter- and Half-wavelength lines

Electromagnetic Radiation, Types of Radio waves Propagation, Ground Wave propagation, Sky Wave Propagation, Troposphere or Space Wave Propagation, Troposphere Scattering.

Unit 3: Amplitude Modulation and Angle Modulation: FM And PM

Theory of AM, A M Generation, Doubled Sideband Suppressed Carrier Modulation, Description of SSB, carrier Suppression, Unwanted Sideband Suppression
Demodulation of AM, Envelope Detection, Principal of Demodulation of SSB
Frequency & Phase Modulation Theory, Frequency Modulation Bandwidth, Phase Modulation, Generation of Frequency Modulation, FM Demodulation: AM-Based Method, Detection of Phase Modulation

Recommended List of Books :

1) Electronic Communication : Analog , Digital and Wireless - Sanjeev Gupta, 3rd Ed, Khanna Publication
2) Electronic Communication Systems - Kennedy, Davis 4th Ed., TMG
3) Electronic Communications -Dennis Roddy , John Coolen
4) Electronics and communication technology - J S Katre ,2012 Ed, Tech -Max Publication
5) Electronics & Radio Engineering – Terman – 4th Ed, Mc Graw Hill
6) Communication Systems – Simon Haykin , 3rd Ed, John Willy & Sons Inc
7) Electronics & Radio Engineering – M. L . Gupta , 9th Edition, Dhanpat Rai publication

List of Experiments for paper VII

Practical list

1. Study of AM
2. Study of Amplitude Demodulation
3. Study of FM
4. Study of Frequency Demodulation

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SEMESTER V: Paper VIII

Introduction to Microcontrollers

Unit 1:

Block diagram of Microcontroller – Comparison with Microprocessor and Microcontroller – Pin details of 8051 – ALU – Special function registers – ROM – RAM – RAM Memory Map (including registers and register banks) – Program Counter – PSW register –Stack - I/O Ports – Timer Interrupt – Serial Port – External memory – Clock – Reset – Clock Cycle –Machine Cycle – Instruction cycle – Instruction fetching and execution -Overview of 8051 family.

Unit 2:

Assembling and running an 8051 program – Instruction set of 8051 – Data transfer instructions – Different addressing modes – Arithmetic Instructions – Signed number concepts and arithmetic operations – Logic and Compare instructions – Rotate instruction and data serialization – BCD, ASCII – Loop and jump instructions – Call instructions – Time delay routines – Program control – Assembler directives – Sample programs.

Unit 3:

Bit addresses for I/O and RAM – I/O programming – I/O bit manipulation programming – Programming 8051 Timers – Counter programming – Basics of Serial programming – 8051 connection to RS 232 – 8051 Serial Port Programming – 8051 interrupt – Programming Timer Interrupt – Programming external hardware interrupts – Programming the serial communication interrupt – Interrupt priority in 8051.

Recommended List of Books :

1. 8051 Microcontroller by Kenneth J.Ayala.
2. Microprocessor and Microcontroller by R.Theagarajan, Sci Tech Publication, Chennai
3. 8051 Microcontroller and Embedded Systems using Assembly and C by Mazidi, Mazidi and D.MacKinlay, 2006 Pearson Education Low Price Edition.
4. Microprocessor and Microcontroller by R.Theagarajan, Sci Tech Publication, Chennai
5. Programming customizing the 8051 Microcontroller by Myke Predko, Tata McGraw Hill

List of Experiments for paper VIII

1. Getting started with the 8051 – reading and writing ports
2. Writing a Delay
3. Turning on an LED
4. Blink an LED Without using the delay() Function
5. Using a Button
6. De-bouncing a Button
7. ASCII to packed BCD
8. BCD to ASCII

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SEMESTER V: Paper IX

Basic Instrument and Measurement

Unit I: Measurement Characteristics

Static characteristics (Accuracy and precision, Resolution, Threshold, Linearity, hysteresis, sensitivity, etc), Errors and its types, absolute and relative, Gross, systematic and random errors, Methods of correction, Statistical analysis, Gaussian error distribution curve, probable error.

Unit 2: Electrical Measurements

Construction and working of Galvanometer, PMMC, D'Arsonval meter, Conversion into ammeter and voltmeter, Range selection. C bridges, General equation of A C Bridge, Comparison, Measurement of inductance and capacitance, Desauty, Schearing, Maxwell and Wein's bridge

Unit 3: Transducers

Types, classifications and selection of transducers, Resistive transducers, strain gauge, theory, gauge factor, semiconductors strain gauge, application, capacitive transducers, types, variable area, distance and dielectric type, differential arrangement, inductive transducers, principle and working, temperature measurement, electrical methods, thermistor characteristics and application.

Recommended List of Books :

1. W D Cooper, Electronics Instrumentation and Measurement Techniques, PHI, New Delhi.
2. B E Jones, Instrumentation, Measurements, and Magnitudes, THM, New Delhi.
3. D S Sonde, Monographs with Solid Sate Electronic Instrumentation Vol-I to IV,THM, New Delhi.
4. A P Malvino, Electronics Instrumentation Fundamentals.
5. E O Dobelin, Measurement Systems, McGraw Hill
6. Kalsi H S,

List of Experiments for paper IX

1. Maxwell Bridge
2. Schearing Bridge
3. Weins Bridge
4. Thermistor as a Temperature Transducer
5. Gaussian Error distribution curve

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SEMESTER V: Paper X

Measurement Systems and Industrial Instrumentation

Unit 1: Measurements Systems

Functional element of instrumentation, examples, (pressure gauge, and Bourdon types thermometer), Input output configuration, schematics, examples, methods of corrections, high gain feed-back, opposing input and signal filtering, examples.

Unit 2: Analysis of measurement System

Dynamic characteristics, speed of response, time lag, input impedance and stiffness, generalized mathematical model of measurement systems, operational transfer function, sinusoidal transfer function, zero, first, and second order measurement systems, step, ramp, and frequency response of first order system, step response of second order system

Unit 3: Measurements

Pressure Measurement:
Pressure measurement, elastic elements, Bourdon tubes, Diaphragm and Bellow gauges, electrical methods, strain gauge, potentiometer etc. variable capacitance types, LVDT

Flow measurement:
Introduction, classification of flow methods, electrical methods, M flow meter, Ultrasonic flow meter, laser annemometer

Recommended List of Books :

1. W D Cooper, Electronics Instrumentation and Measurement Techniques, PHI, New Delhi.
2. B E Jones, Instrumentation, Measurements, and Magnitudes, THM, New Delhi.
3. D S Sonde, Monographs with Solid Sate Electronic Instrumentation Vol-I to IV,THM, New Delhi.
4. A P Malvino, Electronics Instrumentation Fundamentals.
5. E O Dobelin, Measurement Systems, McGraw Hill

List of Experiments for paper X

1. Time constant of first order system (RC Circuit)
2. Frequency response of first order system
3. Potentiometer / strain gauge as pressure measuring device
4. LVDT Characteristics

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SEMESTER V: Paper XI

Programming Language for Microcontroller

Unit 1:

Variables and constants in C, Rules for construction of variables and constants, C keywords, Data types in C, integers and chars; signed-unsigned, floats-doubles, storage of data types, Operators and its hierarchy, type conversion, Loop and decision Control structures like if, if-else, else-if, While, For, Do-while, switch case structure

Unit 2:

Functions and Pointers, passing values between functions, scope of functions, advance features of functions, Recursion

Unit 3:

Arrays initialization, passing array elements to a function, passing array to a function, pointers and arrays two dimensional arrays, arrays of pointers, pointers and strings, standard string function library. Two dimensional arrays of characters, arrays of pointers to strings

Recommended List of Books:

1) Let us C, 9th Ed, Y. Kanetkar, BPB Publication

List of Experiments for paper VIII

1. Minimum 10 experiments covering the full syllabus

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SEMESTER VI : Paper VI

Linear Integrated Systems

Unit I: Frequency response of op-amp

Frequency response, Frequency response of internally compensated op-amps, high frequency op-amp equivalent circuit, open loop voltage gain as a function of frequency, closed loop Frequency response, circuit stability, slew rate, Problems.

Unit II: Active filters and oscillators

Active filters, First order low-pass Butterworth filter, Second order low-pass Butterworth filter, , First order high-pass Butterworth filter, Second order high-pass Butterworth filter, higher order filters, Band pass filters, Band reject filters, All pass filters, Oscillators, Phase shift oscillator, Wien bridge oscillator, Square wave generator, Triangular wave generator, Saw tooth wave generator, VCO, PSpice simulation and design problems

Unit III: Comparators and converters

Basic Comparator, Zero crossing detector, Schmitt trigger, Comparator characteristics, limitations of op-amp as Comparator, voltage limiters, analog-to-digital and digital –to-analog converters, clippers and clampers, absolute value output circuit, peak detector, sample and hold circuit, 555 timer IC and its applications, 565 PLL IC and its applications, PSpice simulation and design problems

Recommended List of Books :

1) R A Gayakwad, Op-Amps and Linear Integrated Circuits, PHI, New Delhi
2) P R Gray and R G Meyer, Analysis and Design of Integrated Circuits, John Wiley & Sons
3) R F Coughlin and A F F Driscoll, Operational Amplifiers and Linear Integrated Circuits, PHI, New Delhi

Practical:

1. Study of slew rate and CMRR of an op-amp
2. Study of active filters
3. Study of RC oscillators using op-amp
4. Study of comparator and Zero crossing detector
5. Study of 741 as an astable multivibrator
6. Study of IC555 as an astable multivibrator
7. Study of IC555 as a monostable multivibrator

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SEMESTER VI : Paper VII

Advance Communication Systems

Unit 1: Digital Communication

Introduction, pulse modulation, PCM, PCM Sampling, Signal To Quantization Noise Ratio, Linear Versus Non Linear OCM Codes, Ideal Channel Noise, coding methods, Companding

Unit 2: Fiber Optics and Wireless Communication System

Introduction, Basic Fiber Optic System, Physical Description, Theory of optical fiber, dispersion, losses in fiber, optical transmitters, Receiver, Fiber Optic Cable: Splices, Connectors and couplers

Introduction, Wireless Application And Services, Features Of Wireless Communication System, Mobile Phone, Cellular Technology Concept, 1G,2G,2.5G,3G Cellular System, Multiple Access Techniques: FDMA, TDMA, CDMA

Unit 3: Satellite Communication System

Introduction, Kepler's law, Orbit, Attitude Control, Satellite Station Keeping, Antenna Look Angles, Transponders, Uplink and Downlink Power Budget Calculation, Digital carrier Transmission, Multiple-access Methods

Recommended List of Books :

1) Electronic Communication : Analog , Digital and Wireless - Sanjeev Gupta, 3rd Ed, Khanna Publication .
2) Electronic Communication Systems - Kennedy, Davis 4th Ed TMG
3) Monochrome and Colour Television by R R Gulati,2nd Ed, New Age International
4) Electronic Communications -Dennis Roddy , John Coolen
5) Electronics and communication technology - J S Katre ,2012 ed Tech -Max Pub
6) Electronics & Radio Engineering – Terman – 4th Ed, Mc Graw Hill
7) Communication Systems – Simon Haykin , 3rd Ed, John Willy & Sons Inc
8) Electronics & Radio Engineering – M. L . Gupta , 9th Ed, Dhanpat Rai Pub
9) Advance Electronics communication System by WAYNE TOMASI
10) Wireless Communication by U.S. Shah

List of Experiments for paper VII

1. Study of TDM
2. Study of Sample and Hold circuit
3. Study of SHR
4. Study of Fiber optics Voice transmission
5. Study of Bending loss in Fiber Optics System

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SEMESTER VI : Paper VIII

Microcontroller and Embedded System

Unit 1:

8051 interfacing to external memory – 8051 interfacing with the 8255 – interfacing a Relays and opto isolators – Sensors interfacing and signal conditioning – ADC interfacing – DAC interfacing - Seven segment and LCD display interfacing

Unit 2:

Comparison of Assembly Language and "C", Data types and time delay in 8051 C, I/O programming in 8051 C, Logic operations in 8051 C, Data conversion programs in 8051 C, Accessing code ROM space in 8051 C, Data serialization using 8051 C. Pin description of the 8051, Design and test of 8051 Minimum Module, Explaining the Intel hex file. Programming 8051 timers, Counter programming, Programming timers 0 and 1 in 8051 C. Basics of serial communication, 8051 connection to RS232, 8051 serial port programming in Assembly, Programming the second serial port, Serial port programming in C.

Unit 3:

Understanding the Arduino framework, Hardware and interfacing pin descriptions, downloading and installing the IDE (integrated development environment), Arduino IDE and sketch overview, writing simple program like

Recommended List of Books :

1. 8051 Microcontroller by Kenneth J.Ayala.
2. Microprocessor and Microcontroller by R.Theagarajan, Sci Tech Publication, Chennai
3. 8051 Microcontroller and Embedded Systems using Assembly and C by Mazidi, Mazidi and D.MacKinlay, 2006 Pearson Education Low Price Edition.
4. Microprocessor and Microcontroller by R.Theagarajan, Sci Tech Publication, Chennai
5. The 8051 Micorcontroller and Embedded Systems using Assembly and C, by Kenneth J. Ayala and Dhananjay V Gadre
6. Programming customizing the 8051 Microcontroller by Myke Predko, Tata McGraw Hill

List of Experiments for paper VIII

1. Writing a delay without using delay function and with delay function
2. 7-segment LED (direct driven and decoded)
3. A/D conversion
4. Interfacing Keys
5. D/A conversion (may use a speaker to here different frequency using a speaker)
6. The LCD Display Interfacing
7. All the above practical's should be done using an Arduino also.

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SEMESTER VI : Paper IX

Electronic Instrumentation

Unit 1: Signal generators and Analysers

Pulse and square wave generator, function generator, wave analyzer, types, harmonics distortion analyser.

Unit 2:

Oscilloscope, CRT, basic CRO circuit, time base generator, free running mode, triggering mode, synchronization, delay line, CRO probes, special purpose CRO, digital storage Oscilloscope

Analog multimeter, electronic analog multimeter, volt-ohm meter, FET input-volt meter, Micro volt meter, digit voltmeter, types (ramp type, integrating, etc) , digital frequency meter, electronic phase meter, digital multimeter

Unit 3: Trouble shooting techniques

Maintenance, need, common faults, corrective and preventive maintenance, methods of fault location, sequential and non sequential checks, random check, half split, beginning to end technique

Recommended List of Books :

1. W D Cooper, Electronics Instrumentation and Measurement Techniques, PHI, New Delhi.
2. B E Jones, Instrumentation, Measurements, and Magnitudes, THM, New Delhi.
3. D S Sonde, Monographs with Solid Sate Electronic Instrumentation Vol-I to IV,THM, New Delhi.
4. A P Malvino, Electronics Instrumentation Fundamentals.
5. E O Dobelin, Measurement Systems, McGraw Hill

List of Experiments for paper VIII

1. Generation of square wave and triangular wave
2. Lissagus figure
3. Study of digital storage oscilloscope

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SEMESTER VI : Paper X

Applications of Communication Systems

Unit 1: Radio Receivers

TRF Receivers, Super heterodyne Receivers, AM Receivers: Frequency Changing, Super heterodyne Tracking, Local Oscillator, Intermediate Frequencies and IF Amplifiers, Diode Detector, Automatic Gain Control, Automatic Frequency Control, FM Receivers : Comparison with AM receivers, Amplitude Limiting, Basic FM demodulators, Radio detector, FM demodulator comparison

Unit 2: Television Systems and RADAR

Elements of a television System, Composite Video Signal, Channel Bandwidth, Vestigial sideband Transmission, monochrome Picture tube, Beam Deflection, Videocon, Television Transmitter, Positive and Negative Modulation, receiver Section, Principle of Colour Television, luminance, Hue and Brightness, NTSC Colour TV System, PAL Colour TV System,SECAME System

Radar Fundamental, Basic Pulsed Radar System, Display Methods, Moving Target Indication (MTI) Radar, CW Doppler Radar

Unit 3: Microwave Tube Oscillators and Amplifiers

Multi-cavity Klystron, Reflex Klystron, and Magnetron: Introduction, Operation, Travelling Wave Tube (TWT)

Recommended List of Books :

1) Advance Electronics communication System by WAYNE TOMASI Pearson/Prentice Hall, 2004
2) Electronics Devices and Circuits, Sanjeev Gupta
3) Electronic Communications, Dennis Roddy, John Coolen
4) Wireless Communication, U.S. Shah
5) Digital communications – S.K. Venkata Ram 1st Ed, S. Chand
6) Understanding Fiber Optics - Jeff Hecht 2nd Ed SAMS Publication
7) Electronics & Radio Engineering – M.L . Gupta , 9th Ed, Dhanpat Rai Publication
8) Electronic Communication Systems, Kennedy, Davis
9) Monochrome and Colour Television, R R Gulati

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SEMESTER VI : Paper XI

Simulation using MATLAB

Unit- I:
Introduction to MATLAB, overview, starting MATLAB Session, understanding the MATLAB desktop and its environment, quitting the MATLAB session

Unit-II:
Elementary MATLAB Constructs, MATLAB Variables, Arithmetic Operations, Logical and Relational Operations, Mathematical Functions, Graphical Functions, I/O Operations, Elementary Matrix Manipulations
MATLAB Programming, MATLAB Procedures, MATLAB Functions, MATLAB Language Constructs, Function Handles, Solution of Differential Equations

Unit-III:
SIMULINK, Operating Principle and Management of Simulink, Constructing a Simulink Block Diagram, Parametrizing Simulink Blocks, Simulink Simulation, Solving Differential Equations with Simulink, Simplification of Simulink Systems, the Function Block, Construction of Subsystems, Interaction with MATLAB, Simulations in MATLAB, Transfer of Variables through Global Variables, Dealing with Characteristic Curves

Recommended List of Books :
1) Y Kirani Singh & B B Chaudhuri, MATLAB Programming, PHI, New Delhi
2) Rudra Pratap , Getting Started with MATLAB 7, Oxford University Press (Indian Edition).
3) Steven T. Karris,Signals and Systems with MATLAB ® Computing and Simulink ® Modeling,4th edition, 2008, Orchard Publications
4) B. Hunt, R. Lipsman, J. Rosenberg, K. Coombes, J. Osborn, G. Stuck A Guide to MATLB for Beginners and Experienced users, Cambridge University Press, 2001.
5) Andrew Knight, CHAPMAN & HALL/CRC Andrew Knight , BASICS OF MATLAB® and Beyond
6) INTRODUCTION TO MATLAB® & SIMULINK *A Project Approach,* Third Edition
O. BEUCHER and M. WEEKS

List of Experiments for paper XI
1. Hands on with MATLAB (Data type operators writing of simple equations etc.)
2. Vectors and Matrices
3. Vectors and matrix operations
4. Simulation:
    1. To create arrays and vectors and perform arithmetic and trigonometric operations on them.
    2. To make simple 2-D plot in MATLAB
    3. To create script files and execute them in MATLAB
    4. To learn difference between a script file and a function file and execute a function file.
    5. Array and matrix simple computation and manipulation.
    6. To define and use anonymous functions in command-line computation.
    7. To learn and do simple symbolic algebra in MATLAB.
    8. To read data from common data files into MATLAB workspace and save data into a MATLAB readable file.
    9. Publish report

Laboratory/Experimental Work

There shall be 6 practical / Experimental works each of three hours duration per week per batch in semester 5 and 6. Since the inception of the course, the batch size is of 10 students per batch which shall continue. The project work shall be considered as part of laboratory / experimental work and will be compulsory for a student to complete in the final semester i. e. Semester 6. The project work shall be equivalent to 3 practical per week.