Veer Narmad South Gujarat University, Surat

Syllabus for S Y B Sc (Electronics)

Semester–3 (with effect from ***June 2012***)

Electronics Paper – 3 (*Electronics Circuits & Applications*)

Unit-I: *Transistor Biasing and h-parameters*

Transistor Biasing:

Introduction; Factors contributing to thermal instability; Effect of temperature increase; Stability factor; Operating point; Different methods for transistor biasing: Fixed –bias circuit; Collector-to-base bias; Disadvantages of collector-to-base bias; Voltage divider bias with emitter bias; Bias compensation; Design operations

h- Parameter:

Introduction; General "black box" theory; Generalized approximate model; Conversion of an amplifier circuit to a standard form; Hybrid h parameters; Obtaining the hybrid h-parameters; Simplified CE hybrid model; Typical h-parameter values

Unit-II: *Small Signal Amplifier& Feedback in Amplifier*

Introduction; Classification of amplifiers; General theory of amplifier Analysis; CE, CC, CB amplifier analysis using simplified hybrid model; Voltage and current gains taking into account R_g of source; Dependence of amplifier characteristics on R_L and R_g; Effect of an emitter bypass capacitor and coupling capacitor on low frequency response; R_C coupled transistor amplifier; Lower cut-off frequency f_1; Upper cut-off frequency f_2; Frequency response curve and band width; Transformer coupled amplifier

Unit-III: *Feedback in Amplifier*

Introduction; Feedback concepts; General theory of feedback; Reasons for negative feedback; Loop gain; Types of negative feedback in transistor circuits; Advantages of negative feedback; Change input impedance and output impedance in voltage series feedback, current shunt feedback, voltage shunt feedback, voltage series feedback, current shunt feedback, current series feedback; Increase in bandwidth; Stabilization; reduction in non-linear distortion; Reduction in noise; Negative current feedback circuit; Emitter follower; Practical feedback circuits

Recommended Books:

1) A Mottershead, Electronics Devices and Circuits An Introduction, PHI, New Delhi.
2) Sanjeev Gupta, Electronics Devices and Circuits, Dhanpat Rai Publications
3) R Boylestad and L Nashelsky, Electronics Devices and Circuits,
4) I J Nagrath, Electronics Devices and Circuits, PHI, New Delhi (2007)
5) Millman, Halkias, Satyabrata, Electronics Devices and Circuits, TMH, New Delhi
6) R Gayakwad, OpAmps and Linear Integrated Circuits, (3rd Edition), PHI, New Delhi.

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Syllabus for S Y B Sc (Electronics)

Semester–3 (with effect from ***June 2012***)

Electronics Paper – 4 (*Advance Digital Electronics & Circuit Design*)

Unit-I: *Flip-flops and Concept of Memory*

Construction and working of RS Flip-flop, limitations, D flip-flop, construction and working, , construction and working of JK flip-flop, Master-slave JK Flip-flop, flip-flop as a memory element, types of semiconductor memory, RAM ROM EPROM DRAM SRAM etc.., basic concept of memory chip and its organization, address data lines, chip select-enable and its functions

Unit-II: *Registers and Counters*

Use of flip-flop as register, introduction to shift register, types of shift registers

Introduction to counter, basic ripple counter, working and waveforms of ripple counter, types of counters, Up / Down counters, modulus of counter, design of counters with various modulus values, synchronous and asynchronous counters

Unit-III: *Sequential Circuit Design & Some Special Circuits*

Introduction; Analysis of clocked sequential circuits: State table, State diagram, state equation, Flip-flop input function; State reduction and assignment; Flip-flop excitation table; Design procedure: design with unused states; Design of Counters; Design with state equitation; Tabulation method; Determination of prime-implicants; Selection of prime-implicants; QuineMc-Clusky Method. (3.9, 3.10, 3.11, 3.12, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9 of Digital Logic and Computer Design by M Mano, PHI)

Controlled inverter, digital comparator, parity checker, parity generator, 4 bit parallel binary adder, 4 bit parallel binary addition/subtraction, 4-bit parallel fast look ahead carry adder, BCD adder, Digital clock, 4-bit magnitude comparator (M Mano - Computer System Architecture),

Recommended Books:

1) N N Biswas Logic Design Theroy, PHI New Delhi
2) M Mano, Computer System Architecture, PHI, New Delhi
3) M Mano, Digital Logic and Computer Design, PHI, New Delhi
4) A Anand Kumar, Fundamentals of Digital Circuits, PHI, New Delhi
5) Malvino & Leach, Digital Principles and Applications, TMH
6) W H Gothamann, Digital Electronics An Introduction to Theory and Practice, PHI, New Delhi

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Syllabus for S Y B Sc (Electronics)

Semester–3 (with effect from ***June 2012***)

Electronics Paper – 5 (*Linear Power Electronics*)

Unit-I: *Rectifiers and Filters*

Introduction; half and full wave rectifier; capacitor filter: capacitor filter with full wave rectifier, ripple voltage; Inductor filter: Inductor filter with full wave rectifier, L section filter.

Unit-II: *Regulators*

Introduction; Stabilization; Reference element, Zener shunt regulator: Designing of Zener shunt regulator; ripple, other features, limitation of basic Zener shunt regulator, Extending power and current range of basic Zener diode; Transistor shunt regulator, emitter follower regulator; Series pass regulators, Feedback regulators; Sample, reference, comparator and controller.

Three Terminal Regulators

Introduction, block diagram of three terminal regulator: applications of three terminal regulator; adjustable output voltage three terminal regulator ; variable output power supply, dual power supply. (78xx series, 79xx series, LM317 & LM337)

Unit-III: *Battery Chargers*

Electric current, electro chemical action in simple cell, primary and secondary cell, dry cell, lead acid accumulator or secondary cell, battery charging, testing of storage battery, maintenance of battery, button cells, resistance of battery, measurement of internal resistance of cell, Nickel-Cadmium rechargeable cell, comparison between Ni-Cd cell and lead acid cell, other sources of emf, soloar cell, battery charger circuits.

Recommended Books:

1) N C Goyal& R K Khetan, Monograph on Electronics Design Principles, Khanna Publishers
2) M D Singh and K B Khanchandani, Power Electronics, TMH, New Delhi
3) A K Sawhney, Electricals and Electronics Measurement and Instrumentation,

Veer Narmad South Gujarat University, Surat

Syllabus for Practical Laboratory work in Electronics at S Y B Sc (Electronics)

Semester–3 (with effect from ***June 2012***)

Three will be three days of Laboratory/practical work per week each of three hours duration. The examination will be one practical each from the three groups viz Electronics Circuits, Digital Electronics, and Power Electronics.

List of Laboratory Experiments Electronics for S Y B Sc Semester - 3:

Paper - 3

1. Study of h-parameter
2. Study of Transistor biasing circuit and plotting the load line
3. Design, built and test RC Coupled Amplifier.
4. Study of Voltage Series feedback amplifier.
5. Study of Current Shunt feedback amplifier
6. Study of emitter follower.

Paper - 4

7. Study of RS flip-flop.
8. Study of JK flip-flop.
9. Study of 4-bit up/down counter
10. Study of decade counter.
11. 4 bit parallel binary addition/subtraction
12. BCD adder

Paper - 5

13. Study of rectifier and filters (LC, π-filters)
14. Zener Regulator
15. Design, built and test 3 terminal regulator
16. Design build and test variable output 3 terminal regulator
17. Study of Battery Charger
18. Solar Cell Characteristics

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Syllabus for S Y B Sc (Electronics)

Semester–4 (with effect from ***June 2012***)

Electronics Paper – 3 (*Amplifiers & Linear Integrated Circuits*)

Unit- I: *Oscillators and Multivibrators*

Oscillators:

Introduction; Effect of positive feedback; Oscillator operations; Types of oscillators; Requirement for oscillator; Phase Shift oscillator; Wein bridge oscillators; Resonant circuit oscillator; Colpitt's oscillator, Hartley oscillator; Unijuction oscillator; Schmitt trigger

Multivibrators:

Introduction to multivibrators and transistor switch; Bistable multivibrator; Triggering of Bistable multivibrator, Astable multivibrator & Monostable multivibrator.

Unit –II: *Large Signal Amplifier & Tuned Amplifier*

Introduction; Difference between voltage amplifier and power amplifier; Terms used in power amplifier; Class-A amplifier; Transformer coupled Class-A amplifier; Harmonic distortion in amplifier; Class-A Push-pull power amplifier; Class-B power amplifier; Class-B Push-pull amplifier; Cross-over distortion; Class-AB Push-pull amplifier; Complementary Symmetry

Tuned amplifier

Need for Tuned amplifier; few fundamentals about tuned amplifier; Single Tuned amplifier; Double tuned amplifier;

Unit –III: *Differential Amplifiers*

Introduction; Differential amplifier; Differential amplifier circuit configurations; Dual-Input, Balanced-Output Differential Amplifier; DC and AC Analysis, Inverting and Non-inverting Inputs, CMRR; Dual-Input, Unbalanced-Output Differential Amplifier; DC and AC Analysis; Single-Input, Balanced-Output Differential Amplifier; DC and AC Analysis; Single-Input, Unbalanced-Output Differential Amplifier; DC and AC Analysis; Differential amplifier with Swamping resistors; Constant current bias; Current Mirror; Level Translator

Recommended Books:

1) A Mottershead, Electronics Devices and Circuits An Introduction, PHI, New Delhi.
2) Sanjeev Gupta, Electronics Devices and Circuits, Dhanpatrai Publications
3) R Boylestad and L Nashelsky, Electronics Devices and Circuits,
4) I J Nagrath, Electronics Devices and Circuits, PHI, New Delhi (2007)
5) Millman, Halkias, Satyabrata, Electronics Devices and Circuits, TMH, New Delhi
6) R Gayakwad, OPAmps and Linera Intergarted Circuits, (3rd Edition), PHI, New Delhi.A: A. Mottershead

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Syllabus for S Y B Sc (Electronics)

Semester–4 (with effect from ***June 2012***)

Electronics Paper – 4 (Microprocessor 8085)

Unit-I: *Microprocessor 8085A Architecture*

Introduction; Intel 8085A: Architecture of microprocessor 8085, Register Set, General purpose Registers and Special Purpose Registers, ALU, Timing and Control unit, Flag registers

8085 Pin Diagram, Clock and Reset Circuits, importance of ALE & de-multiplexing of address and data bus, Memory interfacing and decoding of address and control signals, Memory mapped I/O and I/O mapped I/O, Hardware and software interrupt, vectored interrupt and non-vectored interrupt; Addressing scheme;

Unit-II: *Assembly Language Programming*

Addressing Mode, Instruction word size, Instruction Cycle: Fetch and Execution cycle; Concept of timing diagram of some of the basic operation of 8085A microprocessor: Op Code fetch, memory read, memory write, I/O read, I/O write; Concept of Tri-state; Instruction set of 8085A: Data transfer Instructions, Arithmetic and Logical Instructions, Branch, Stack, I/O and Machine control Instructions

Concept and importance of algorithm and flow chart, introduction to assembler and use of assembler for the following programs

Suggested list of program to be done in class and practical

1. *Addition of two and series of 8-bits/16-bits numbers*
2. *Decimal addition of two 8-bits/16-bits numbers*
3. *Decimal subtraction*
4. *One's and Two's complement of 8-bit/16-bits*
5. *Shifting and Mask-off certain bits*
6. *Largest number, Smallest number from a data array*
7. *To arrange data in ascending and descending order*
8. *Movement of block of data and exchange of block of data from one memory location to other*
9. *Binary up/down counter with appropriate delay*
10. *Decimal up/down counter with appropriate delay*
11. *Delay subroutine using one/two registers*
12. *Blinking an LED*
13. *Detecting a KEY*

(Note: Above list of Programs is only a suggestive list. Students should practice sufficient programs covering the complete Instruction set and concept of 8085A microprocessor programming.)

Unit-III: *Programmable Peripheral Interface Chip*

Programmable Peripheral Interface: 8255; Functional Description: Operational Modes, Functional Organization, Block diagram of 8255; Programming and Operation; Programming in Mode 0, Mode 1, mode 2.

Programmable Interval Timer 8253: Modes of Operation: Mode 0, Mode 1, Mode 2, Mode 3, Mode 4, Mode 5, Mode 6;Mode Description; Internal Organization and interfacing; Programming 8253;
Interrupts scheme of 8085A:

Recommended Books:

1) Ghose& Sridhar, 0000 to 8085 Introduction to Microprocessors for Engineers and Scientists, PHI New Delhi
2) R S Gaonkar, Microprocessor,
3) Mathur, Microprocessor 8085 and its interfacing, 2nd Ed, PHI, New Delhi
4) Srinath, 8085 Microprocessor: Programming and Interfacing, PHI, New Delhi

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Syllabus for S Y B Sc (Electronics)

Semester–4 (with effect from ***June 2012***)

Electronics Paper – 5 (Switching Power Supply)

Unit-I: *Thyresistors, four layer device, construction and working of an SCR, two transistor analogy, characteristics of SCR, construction working DIAC & DIAC characteristics, construction working TRIAC & TRIAC characteristics*

Unit-II: *SMPS and Inverter-Choppers*

SMPS

Introduction, comparison of SMPS, and linear type power supplies, principle, fly-back convertors, forward type converters, selection of transformer, transistors, diodes and capacitors, control IC for SMPS, applications of SG 3524.

Inverter-Choppers

Principle of inverter: Series, parallel and bridge inverter, McMurray inverter, McMurray Bedford inverter, Voltage controlled and current source inverter, Principles of choppers: single and two thyriator chopper, step up chopper, AC chopper.

Unit-III: *UPS*

Types of UPS: Continuous duty UPS & stand by UPS, comparison, UPS configurations: forward and reverse transfer, selection of UPS, Component: Battery charger, battery bank and transfer switch.

Noise:

Types, reduction of induced voltage, evaluation of noise, noise in BJT and FET, Signal to noise power ratio, noise figure.

Recommended Books:

1) N C Goyal & R K Khetan, Monograph on Electronics Design Principles, Khanna Publishers
2) M D Singh and K B Khanchandani, Power Electronics, TMH, New Delhi
3) A K Sawhney, Electricals and Electronics Measurement and Instrumentation

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Syllabus for Practical Laboratory work in Electronics at S Y B Sc (Electronics)

Semester–4 (with effect from ***June 2012***)

Three will be three days of Laboratory/practical work per week each of three hours duration. The examination will be one practical each from the three groups viz Amplifier Circuits, and Microprocessor There will be a minor project work to be carried out by students in a group of not more than four students in a group.

List of Laboratory Experiments Electronics for S Y B Sc Semester - 4:

Paper - 3

1. Phase shift oscillator
2. Wein bridge oscillator
3. Colpitt's oscillator
4. Hartley oscillator

Paper - 5

5. Astable multivibrator
6. Monostable multivibrator
7. Bistable multivibrator
8. Power Amplifie
9. Differential amplifier
10. SCR characteristics

Paper – 4 : Microprocessor

1. *Addition of two and series of 8-bits/16-bits numbers*
2. *Decimal addition of two 8-bits/16-bits numbers*
3. *Decimal subtraction*
4. *One's and Two's complement of 8-bit/16-bits*
5. *Shifting and Mask-off certain bits*
6. *Largest number, Smallest number from a data array*
7. *To arrange data in ascending and descending order*
8. *Movement of block of data and exchange of block of data from one memory location to other*
9. *Binary up/down counter with appropriate delay*
10. *Decimal up/down counter with appropriate delay*
11. *Delay subroutine using one/two registers*
12. *Blinking an LED*
13. *Detecting a KEY*

Project:

- A student is required to take up a **minor project** work as a part of the laboratory work
- Objectives of the project is to learn small concepts of electronics & the project methodology
- The project work will carry **one-third** proportion of the laboratory work
- The project work should be carried out by the students in a group of not more than 4 students (Preferably 3)

- The students are required to make a project report and demonstrate their work and appear for the project viva
- The project work will be in lieu of practicals of paper-5 for examination purpose only. The students can opt for project or practicals of paper-5.