S.Y.B.Sc. Electronic Science
Revised Syllabus
To be implemented from June 2009.

1) **Title of the course:** Second Year B.Sc. Electronic Science
2) **Introduction:** Semester Pattern is followed at S.Y.B.Sc. Electronic Science. Second year B.Sc. syllabus is desired to provide core technical skills in design, analysis, building and testing electronic blocks / circuits. Training on equipment handling and maintenance is also included. In the theory courses adequate knowledge of Analog circuit design, digital circuit design, communication systems and electronic circuit measurement and testing instrumentation knowledge will be acquired by the students. Student taking admission at S.Y.B.Sc. Electronic Science have to complete 4 theory courses two each semester and one practical course (Annual). In the practical course of 100 marks there are compulsory experiments along with the activities to be done. There are two types of activities – One carried out by the student in his own area of interest and other to be arranged by teachers for enhancement of the practical quality and skills of the students.

3) **Aim and Objectives :**

The aim of the course is to generate the manpower with adequate theory knowledge of the electronic circuit design, instrumentations and practical work along with hands on experiences of the practical work.

Following are the objectives –

i) To design the syllabus with specific focus on key Learning Areas.
ii) To equip student with necessary fundamental concepts and knowledge base.
iii) To develop specific practical skills.
iv) To impart training on circuit design , analysis , building and testing.
v) To prepare students for demonstrating the acquired knowledge.
vi) To encourage student to develop skills for accepting challenges of upcoming technological advancements.

These objectives can be achieved by implementing this syllabus at the second year B.Sc. Electronic Science. Also it will provide foundation for the T.Y.B.Sc. Electronic Science course.

4) **Eligibility:** First Year B.Sc. Pass / ATKT .
5) **Examination –**

A) Pattern of Examination :

i) Semester and Practical

Theory Papers - Two Theory papers of 50 marks per semester
(Internal examination 10 + Semester Examination 40, Total 50)

Practical - At the end of year 100 marks Examination.
(Internal examination 20 + Semester Examination 80, Total 100)

ii) Pattern of the question Paper:

The pattern adopted for theory and practical examination is as below.

Theory: The topic wise weightage is decided as per lecture allotted to cover the syllabus for the topics. The Internal option is also taken into consideration in the process. Equal weightage is given for each topic, and none of the topic can be put up as option by the student for examination.

Internal Examination 10 Marks

Four types of questions – Objective, Fill in the blanks, True or False and One sentence answer.

There are two or three different sets of the question papers used for internal examination in the same class for same paper.

It is continues evaluation process and is executed by the teacher conducting the course.

External Examination 40 Marks

Pattern is as follows-

Q.1 Answer any all of the following : 12 marks
Compulsory no internal option , contains one mark , two mark objective and numerical questions.

Q.2 Answer any TWO. : 08 marks
Three questions are given, each having 4 marks, any two are to be solved.

Q.3 Answer any TWO. : 08 marks
Three questions are given,each having 4 marks, any two are to be solved.

Q.4 Answer any TWO. : 12 marks
Three questions are given, each having 6 marks, any two are to be solved.
There is complete option question for Q.4 having three compulsory numerical problems having weightage of 4 marks each.

Practical : Internal Marks 20 : Continuous assessment
External Examination 80 Marks. – Have to perform 2 experiments of 40 marks of the duration 3 hours each. (Practical Examination is scheduled in two sessions.)

B) Standard of passing: Candidate must score 40% marks at the semester examination in each course. **i.e. 16 marks at semester theory paper 32 marks at the practical course**
There is no separate passing for internal course, however the total marks of internal and external should cross 40% of the total marks to be awarded.

C) **ATKT Rules:** As per University statues

D) Award of Class: Overall class including the subjects offered by the candidate at Second Year B.Sc. Electronic Science.
It will as per University rules as –
Above 70% First class with distinction
Between 60% to 70% First Class
Between 50% to 60% Second Class
From 40% to 50 % Pass class.

However the marks in the electronic science papers at Second Year B.Sc. course will be taken into account , at T.Y.B.Sc. for awarding the ultimate class of the course.

E) **External Students:** Not applicable for this course. External Students are not admitted for the course.

F) **Setting of Questions paper/ Pattern of Question paper:**

Setting of the question paper is as per University Schedule and it is centralized system adopted by University of Pune. Pattern of question paper will be as per decided by Board of Electronic Science, University of Pune.

G) **Verification of Revaluation:** As per University Statutes and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Structure of the course :

i)

a) Compulsory Paper **:** Four theory papers
b) Optional Paper **:** Nil
c) Question paper **: Theory -**
For Internal Examination 10 Marks
For Semester Examination 40 Marks
Practical "
For Internal Examination 20 Marks
For Semester Examination 80 Marks

ii) Medium and Instructions: ENGLISH

7) Equivalence subject/Paper and Transitory Provision:

Semester	OLD Syllabus	New Syllabus
Semester I	EL211 Analog Circuit Design Principles I	Paper - I : Analog Circuits and Systems
	EL 212 Communication I	Paper - II: Electronic Instrumentation
Semester II	EL 221 Analog Circuit Design Principles II	Paper – I: Digital System Design
	EL 222 Communication II	Paper – II: Communications system

8) University Terms: More than 75% attendance is necessary for the course as per University statues.
16 Weeks will be available for completion of theory course.
Practical course will be throughout the year.

9) Subject wise Detail Syllabus and Recommended books:

S.Y.B.Sc. Electronic Science - Semester I
Paper - I : Analog Circuits and Systems

UNIT 1: Amplifiers: (12)

General classification of amplifiers: with respect to signal amplitude, frequency and configuration. Small signal amplifier: A.C.-D.C. analysis, frequency response, Bode plot, stability, Nyquist criteria, gain Bandwidth product. Design of single stage class-A amplifier. Types of coupling (quantitative analysis): RC coupled, transformer coupled and direct coupled. Multi-stage RC coupled CE amplifier: effect of coupling capacitor and bypass capacitor on frequency response (qualitative approach) and application area.

UNIT 2: Power Amplifiers (12)

Comparison of small signal and large signal amplifiers: with respect to gain, efficiency, and distortion. Classification of power amplifiers on the basis of conduction: class-A, class-B, class-AB, class-C, class D, Class E. Class-A amplifier: resistive load/transformer coupled load, efficiency calculation of transformer coupled amplifier, comparison for efficiency, concept of harmonic distortion. Class B amplifier: Efficiency calculation, Push-pull amplifier concept, complimentary symmetry class-B push pull amplifier, crossover distortion, class AB push pull amplifier. Concept, use and types of heat sinks.

UNIT 3: Feedback (08)

Concept of negative and positive feedback. Types of feedbacks circuits: current shunt, current series, voltage shunt and voltage series, comparison and applications. Effect of negative feedback: on amplifier performance, stability of an amplifier. Positive feedback: oscillator circuits -Wien bridge , Phase Shift , Hartley , Colpitts and Crystal.

UNIT 4: Differential Amplifiers (06)

Concept and working of differential amplifier. Configurations of differential amplifier: Single ended, double ended. Differential and Common mode gain. Use of constant current source and its effect on CMRR.

UNIT 5: Opamp and its applications (10)

Internal block diagram of op-amp. Parameters of op-amp (ideal and practical). Inverting and non-inverting configurations. Op-amp Applications: Integrator, Differentiator, Comparator, Voltage to current converter, Current to voltage converter, Bridge amplifier, Instrumentation amplifiers with three op-amp, Precision rectifier, First order Butterworth active filter - Low pass and High pass.

Recommended Books:

1	Malvino A.P	Electronic Principles	TMH
2	Gaykawad R.	Operational amplifiers and linear Integrated Circuits	PHP
3	Clayton G.B.	Operational amplifier	ELBS
4	Millman, Halkias	Electronic devices and circuits	McGrawHill
5	Boylestead	Electronic devices and circuits	PHP
6	Meheta V.K.	Principles of Electronics	S.Chand and Company

S.Y.B.Sc. Electronic Science - Semester I
Paper - II: Electronic Instrumentation

Unit 1: Measurement principles (04)

Measurement of physical parameters, measurement system block diagram. Measurement characteristics like accuracy, precision, Sensitivity, linearity, resolution, reliability, repeatability, errors.

Unit 2: Test and Measuring instruments (18)

Working principle, block diagram, specification and operating procedure for: Voltmeter , Ammeter , Multirange meter , Analog Multimeter , Electronic Voltmeter, True RMS Meter, LCR Meter, DMM, DFM**,** CRO. Types of CROs: dual beam, dual trace, digital storage.

Unit 3: Signal Sources (06)

Working principle, block diagram, specification and operating procedure for: Signal and function generators, Sweep generator.

Unit 4: Power Supplies (10)

Working principle, block diagram, specification and operating procedure for: Fixed voltage power supply, variable power supply, dual power supply, CVCC power supply, SMPS, DC to DC converter, UPS.

Unit 5: Special measurement systems (10)

Working principle, block diagram, specification and operating procedure for: Digital Thermometer, Lux meter, Tachometer, Speedometer, pH meter.

Recommended Books:

1	Helfrik A.& Cooper W.	Modern Electronic Instrumentation and measurement techniques	PHI
2	Rangan, Mani, Sharma	Instrumentation Devices & Systems	TMH
3	Rashid Muhammad H	Power Electronics	PHI
4	Sawhney A.K.	A course in electrical and electronic measurements and instrumentation	Dhanpat Rai & Company
5	B.S.Sonde	Power Supplies	TMH
6	Kalasi H. S.	Electronic Instrumentation	TMH
7	Bouwens	Digital Instrumentations	TMH

S.Y.B.Sc. Electronic Science- Semester II
Paper – I: Digital System Design

UNIT 1: Combinational circuits (12)

Design of code converter: BCD to 7 segments, Binary/ BCD to Gray, Gray to Binary / BCD, serial adder, 4-input priority encoder, parity generator, 4-bit magnitude comparator.

UNIT 2: Sequential circuits (10)

State tables, state diagrams, excitation table and transition table. Design of counters using state machine: asynchronous and synchronous counter, Modulo-n counter, sequence generator, presettable binary up/down counter. Design of Universal shift register.

UNIT 3: Compatibility in digital systems (08)

Fan in Fan Out, Totem pole, Open collector outputs, Tristate Logic, Current Booster, Buffer , Latches, Unidirectional and Bidirectional BUS concepts. TTL and CMOS Logic converters.

UNIT 4: Data Converters (10)

Key Features, Advantages and applications of Digital to Analog Converters: Weighted resistive network and R-2R ladder type. Key Features, Advantages and Applications Specific selection of Analog to Digital Converters: Staircase, Ramp Type, Single Slope and dual slope, Servo Type, Successive approximation and Flash type.

UNIT 5: Digital System Interfacing and Applications (08)

Digital system interfacing of LEDs and Multidigit Seven segment LED display Driver. Interfacing of a switch and switch matrix, Thumb Wheel Switches . Interface considerations for ADC / DAC with digital systems.

Applications of counters: Digital clock , Auto-parking system , totalizers. Applications of shift registers: time delay generator, parallel to serial converter, serial to parallel converter, UART and serial Key board encoder

Recommended Books:

1	Floyd Thomas L	Digital Fundamentals	Pearson Education
2	Raj kamal	Digital System Principles and Design	Wheeler
3	Moriss Mano	Digital Circuit Design	PHP
4	Malvino Leach	Digital Principles and Applications	TMH
5	Strangio	Digital Electronics	TMH
6	Floyd , Jain	Digital Fundamentals	TMH
7	Anand Kumar A.	Switching Theory and Logic design	PHI

S.Y.B.Sc. Electronic Science Semester II
Paper – II: Communications system

1. Basics of communication systems. (14)

Block diagram of communication system. Types of Electronic Communication systems: Simplex, Duplex. Analog/Digital Signals. Noise in communication: External noise- Atmospheric, space noise, man-made noise, Internal noise- Thermal, Shot noise Definitions and relationship between Bit rate, Baud rate, Bandwidth and signal to noise ratio.

Modulation and Demodulation: Need and Types of modulation, AM and FM: Modulating signal, need of carrier signal, modulation index, and percentage modulation. Amplitude and Frequency modulation circuits : AM using diode circuit, FM using varactor diode. Amplitude and Frequency demodulation circuits: AM demodulation using diode detector, FM demodulation using slope detector and Foster-Seeley Discriminator.

2. Transmission Media (08)

Principle, types and applications of - Free space communication using Radio waves and Microwaves, Cable communication using Twisted Pair, Coaxial cable, Fiber Optic Cable.

3. Radio and Television communication (12)

Block diagram of AM (TRF and Superhetrodyne) and FM radio receiver, Receiver characteristics. Elements of TV broadcasting system: scanning, synchronization, composite video signal, audio/video channels. Block diagram of Television receiver, Basic principles of Monochrome and Colour TV, CCTV.

4. Telecommunication Systems (08)

Block diagram of a Telephone handset, principles of Pulse and DTMF dialing, concepts of call routing, PSTN and cellular telephony. Digital communication systems: Block diagram, MODEM, concept of ASK, FSK, PSK.

5. Modern Communication Systems (06)

Basic principles and functioning of: mobile phone, FAX , Set Top box and Dish TV, Internet and its applications, e-commerce, e-banking, e-learning, ATM Machines.

Recommended Books:

1	Kennedy	Electronic Communication, 2nd edition	TMH
2	Frenzel	Communication Electronics,3rd edition	TMH
3	Dennis Roddy,John Coolen	Electronic Communication System	PHI
4	Grob B.	Electronic Principles	TMH
5	Vishwanathan Thiagarajan	Telecommunication Switching Systems and Networks	PHI

S.Y.B.Sc. Electronic Science
Practical Course

- Total Practical to be conducted 20.
- 16 experiments compulsory: At least four practical from each of the ABCD groups.
- One activity equivalent to 2 experiments by the student.
    a. Continuation of F. Y. activity.
    b. PSPICE Simulation
    c. Documentation type experiments
    d. Presentation/Seminar on Electronics /advanced topic/research topics.
- One activity equivalent to 2 experiments to be arranged by the teacher – Arrange at least two practical demonstrations / Workshops which will enhance quality and skills of the student.
- Examination will be conducted on 16 experiments as well as on activities.

Practical Examination –

A) Internal Marks 20: 16 Marks
as usual for 16 marks for experiments and 04 marks for activities

B) Annual examination: 80 Marks **in Two session of 3 Hrs as usual practice.**

Session I 40 marks
Practical work 32 marks
Oral based on the student's own activities 8 marks
Session II 40 marks
Practical work 32 marks
Oral based on Common activities arranged by teachers 8 marks

32 Marks can be divided as -	Circuit diagram	05
	Connection	05
	Demonstration and working explanation	10
	Results	05
	Result analysis / conclusion / comments	02

LIST OF PRACTICALS:

Group A: Analog circuit design

1 Study of commercially available power amplifier(IC). **OR**
Design of complementary symmetry Push pull amplifier.
2 Design and test two stage amplifier. **OR**
Study of effect of negative feedback on frequency response and gain of amplifier.
3 Design and test FET amplifier.
4 Design and testing of Wien bridge/phase shift oscillator.
5 Design and testing of 3 opamp instrumentation amplifier OR Programmable gain amplifier.
6 Design and test First order butterworth active filter(low pass and high pass) **OR**
Design and test V to I converter. (High current and low current).

Group B: Digital circuit design

1 Study of ADC / DAC parameters.
2 Design of counter for given count sequence.
3 Study of Dynamic Display.
4 Design and test Event Counter.
5 Design and testing of 4-bit Parallel Adder.
6 Design of digital clock / combinational lock.
7 Xilinx Simulation on schematic level.

Group C: Communication

1. Design and testing of AM using IC (AD 633) / transistor and detector.
2. Design and testing of FSK modulation.
3. Design and testing of TDM at least four channels.
4. Design and testing of RF Tuned amplifier.
5. Study of PPM, PWM and PAM.
6. Study of TV / Radio / Mobile Receiver.

Group D: Instrumentation

1. Design of resistive ladder for multirange voltmeter.
2. Design of bridge amplifier for temperature measurement system using thermister/ RTD/PT100.
3. Study of DFM for various modes/ Function Generator.
4. Study of CVCC power supply/ variable power supply.
5. Design of digital thermometer using LM 35 and DPM module.
6. Study of UPS/SMPS.
