

SHIVAJI UNIVERSITY, KOLHAPUR.



***** B+
Accredited By NAAC

Revised Syllabus For
Bachelor of Science (Electronics)
(Part I)

(Subject to the modifications to be made from time to time)

Syllabus to be implemented from June 2008 onwards.

Shivaji University, Kolhapur
Revised Syllabus For
Bachelor of Science

1. **TITLE : Subject Electronics**
Optional/ under the Faculty of Science

2. **YEAR OF IMPLEMENTATION:-** Revised Syllabus will be implemented from June 2008 onwards.

4. **GENERAL OBJECTIVES OF THE COURSE**
applicable to the Degree

- 1) To intrudes the students about electronics word
- 2) Study of different components used in electronics
- 3) By using these components study of different electronic circuits and their applications in industry and day to day life industry and day to day life
- 4) Introductions of different circuits used in industry
- 5) To encourage the students to take electronics as a carrier which is the need now a days.
- 6) To make the pupils fit for the society

5. **DURATION**

- **The course shall be a full time course**
- **The duration of degree program shall be of Three years**

6. **PATTERN:-**

Pattern of Examination will be Annual

7. **MEDIUM OF INSTRUCTION :**

The medium of instruction shall be in English

11. STRUCTURE OF COURSE- -----

(Note – The structure & title of papers of the degree as a whole should be submitted at the time of submission/revision of first year syllabus.

FIRST YEAR ----- (NO.OF PAPERS--2-----)

Sr.No.	Subjects	Marks
1.	Basic Electronics Paper I	100
2.	Digital Electronics. Paper II	100
3.	Practical I	50
	Total	250

SECOND YEAR ----- (NO.OF PAPERS-2-----)

Sr.No.	Subjects	Marks
1.	Paper III	100
2.	Paper IV	100
3.	Practical	100
	Total	300

THIRD YEAR ----- (NO.OF PAPERS-4-----)

Sr.No.	Subjects	Marks
1.	Paper V	100
2.	Paper VI	100
3.	Paper VII	100
4.	Paper VIII	100
5.	Practical	200
	Total	600

12. **SCHEME OF TEACHING AND EXAMINATION:-**
 [The scheme of teaching and examination should be given as applicable to the course/paper concerned.]

FIRST YEAR / SEMESTER – I/ II/----

Sr. No.	Subject /Paper	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	T	P	Total	Theory	Term Work	Total
1	Basic Electronics Paper I	2.5			5	100	-	100
2	Digital Electronics Paper II	2.5				100	-	100
3	Practical			4		50	-	50
	Total							250

SECOND YEAR / SEMESTER – III/ ---- --

Scheme of Teaching and Examination

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	T	P	Total	Theory	Term Work	Total
1	Paper III	3			6	100		
2	Paper IV	3				100		
3	Practical I			4				50
4	Practical II			4				50
	Total							300

THIRD YEAR / SEMESTER – V/ ---- --
Scheme of Teaching and Examination

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)				Examination Scheme (Marks)		
		L	T	P	Total	Theory	Term Work	Total
1	Electronics Paper V	3			12	100		100
2	Electronics Paper VI	3				100		100
3	Electronics PaperVII	3				100		100
4	Electronics PaperVIII	3				100		100
5	Practical I			5				50
6	Practical II			5				50
7	Practical III			5				50
8	Practical IV			5				50
	Total							600

13. SCHEME OF EXAMINATION :-

- The examination shall be conducted at the end of each academic year.
- The Theory paper shall carry 100 marks.
- The evaluation of the performance of the students in theory papers shall be on the basis of Annual Examination of 100 marks.
- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

14. STANDARD OF PASSING:-

As Prescribed under rules & regulation for each degree/programme.

16. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

Sr.No.	Title of Old Paper	Title of New Paper
1.	Basic Electronics	Basic Electronics
2.	Digital Electronics	Digital Electronics

B) GENERAL SAFETY RULES FOR LABORATORY WORK

1) List of equipments needed for Laboratory Safety:-

1. Fire extinguisher
 2. First Aid Kit
 3. Good earthing and insulated wirings for electrical supply.
 4. Emergency exit
 5. Apron and goggles wherever necessary
 6. Fuming Chambers
- Operational manuals for instruments (handling to be made as suggested.)

13. Stabilized supply in the laboratory.

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- ### 4) DON'T
1. Don't work alone in the laboratory
 2. Don't take apparatus out of lab.
 3. Don't leave the laboratory without permission.

B. Sc. I – Electronics
Paper I – Basic Electronics. (Total Marks 100)
SECTION – I(Passive Circuit Elements)

Unit:1. Resistors& capacitors

9

Definition of active and passive elements

Resistors: - Definition, symbol and colour code method.

Types of resistors: -

Linear Resistors (Fixed): -Carbon composition, carbon ceramic, carbon film, wire wound.

Linear resistors (Variable): -Wire wound, Potentiometer, Preset.

Non-Linear resistors: - Thermistors, photo resistors and varistors.

[Construction, specification application only.]

Capacitors: - Definition, . Capacitance, capacitive reactance (X_C), Energy stored in a capacitor, charging and discharging of a capacitor, leakage current in capacitor, stray capacitance.

Types of capacitors: -

Fixed electrostatic capacitors: -ceramic, mica, plastic and paper [Construction of ceramic capacitor only]

Fixed electrolytic capacitors: - Aluminum and Tantalum polycarbonate polyethylene.

[Construction of Aluminum only]

Variable capacitors: -Air dielectric capacitor and Trimmers.

Reference: Applied Electronics by:R.S.Sedha

Unit:2 Inductors & Capacitors

9

Inductors: - Definition, symbol, Inductance, Inductive reactance (X_L), Energy stored in an inductor Q-Factor.

Types of Inductors: - Air core, Iron core and ferrite core inductors.

Use of Inductors: - Filter chokes AFC & RFC and Variable inductor.

Transformers: - Principle and construction of transformer, Specification of transformer.

Types of Transformer: - Step-up, step-down transformer

Relays: - Principle, construction and working of electromagnetic relays

Types of Switches: (Explanation using Symbols)

Reference: Applied Electronics by:R.S.Sedha

SECTION – II (Active circuit Elements)

UNIT :5 **Semiconductor diode: -**

9

Definition of PN junction, unbiased junction, formation of depletion layer and internal potential barrier.

Biased junction: - Forward and Reverse biased I-V characteristics of pn junction diode.

[Both forward and reverse biasing]

Junction resistance (i.e. diode resistance)

Diode application, power and current rating of diode, effect of temperature on PN junction diode.

Zener diode: - Breakdown mechanism, Zener and Avalanche Break down, Zener Diode as voltage regulator. specification of Zener diode, point contact diode, applications, effect of temperature on Zener diode, photo diode, varactor diode, LED [Construction and applications only] ,Seven segment display, LCD.

Reference: Applied Electronics by:R.S.Sedha,

- Basic Electronics and Linear circuits N.N.Bharagava, D.C.Kulshreshtha and S.C.Gupta (TMH)

UNIT:6 **BJT (Bipolar Junction Transistor): -**

9

The Junction Transistor, Types, Construction of PNP and NPN

Transistor configurations: - CB, CE and CC configuration ,

I-V characteristics of CB and CE and hence definition of α and β .

Relation between α and β , Leakage current in CB and CE (i.e. I_{CB0} & I_{CE0})

Relation between I_{CB0} & I_{CE0}

UNIT :7 **Transistor Biasing and Thermal Stabilization: -**

9

The operating point, The DC and AC load line, Need of transistor biasing and stability of Q point, Thermal instability.

Method of Biasing: - Fixed bias, Collector to base bias, Self bias or Emitter bias, potential Divider bias, Stabilization factors Definition of stability factors S. temperature compensation using single diode and two diodes, Transistor Rating and specifications for typical transistor SL 100 and BC 148 or BC 548.

UNIT :8 Field Effect Transistor ,UJT,SCR,TRIC: - 9

Field Effect Transistor: -

JFET: - Structure and operation of n-channel FET. The volt-ampere characteristics of FET. FET parameters & Applications.

MOSFETs: - Structure, operation and characteristics of MOSFETs & Applications.

UJT and SCR: -

Structure, operation, characteristics and Applications. Traic- construction and applications.

Books for Section II

- Electronic Devices and Circuits J.Millman & C.C. Halkias (TMH)
- Electronic Devices and Circuits Allen Mottershead (PHI)
- A text book of Applied Electronics R.S.Sedha (S.Chand & Company)
- Basic Electronics and Linear circuits N.N.Bharagava, D.C.Kulshreshtha
and S.C.Gupta (TMH)
- Semiconductor Approximation Malvino
- Principles of Electronics V.K. Mehta (New Edn.)
- Electronic Devices and Circuit Theory R.Boylested & Louis Nashlsky.
- Electronic Devices Floyd

B. Sc. I – Electronics
Paper II – Digital Electronics. (Total Marks 100)

SECTION – I

UNIT:1 Number systems: - 9

Binary Numbers, Binary to Decimal and Decimal to Binary conversion, 1's and 2's complement of Binary Numbers.

Binary Arithmetic: - Addition, Subtraction, Multiplication and Division.

Octal Numbers: - Conversion Octal to Binary, octal to decimal, Binary to octal and decimal to octal.

Hexadecimal Number: - Conversions: Hexadecimal to Binary, hexadecimal to decimal, and Binary to hexadecimal., Singed binary numbers

UNIT:2 Binary codes & Basic Gates: - 9

Binary codes: -

8421 code, Excess 3 code, Gray code, The parity Bit, Alphanumeric codes ASCII and EBCDIC code.

Basic Gates: -

Introduction to logic gates with IC's, 7400, 7402, 7404, 7408, 7432, and 7486, Positive and Negative Logic systems DeMorgan's Theorems, The universality of NAND & NOR gate, TTL NAND gate Specification of TTL logic family, current sinking & current sourcing logic, open collector TTL, CMOS Family(NAND)

UNIT: 3 Boolean Algebra: - 9

Rules and Laws of Boolean Algebra, Boolean expressions for gate networks, Simplification of Boolean expressions, Sum of product and Product of sum method The Karnaugh Map (K-Map) for 2,3 and 4 variables, use of K-Map for reduction of Boolean expression.

UNIT:4 Arithmetic Circuits: -

9

i) Arithmetic Circuits: -

Ex-OR gate and Controlled invertors, half adder, Full adder, Parallel Binary adder, 8421 Adder, Excess 3 adder, half and full sub tractor

ii) Computer organization, I/O devices, Key board, Monitor, Types of Printers.

computer. Specification(Mention only Processor,speed,size of HDD,Size of memory)

SECTION – II

UNIT:5 .Flip-Flop: -

9

R S flip-flop, T & RST flip-flop, Clocked RS and D-flip-flop, Edge Triggered flip- flop.

Positive and negative edge triggered D and JK flip flop, Race around condition, Pulse triggered (Master Slave) JK flip-flop, operating characteristics of flip-flop, Study of IC 7474, 7475 and 7476.

Applications of flip-flop: Parallel data storage, Data transfer and frequency division.

UNIT:6 Counter Techniques: -

9

Counter Techniques: -

Basic counter operations,

Asynchronous Counter: 3Bit Binary counter(Binary Ripple Counter), Asynchronous decade counter, four bit binary counter 7493.

Synchronous or parallel counter: - 3-bit and 4-bit binary synchronous counter, synchronous decade counter, Study IC 74160

Series parallel combination counter Mod-3, Mod-5, and Mod-7 counter Study of IC's 7490, 7492, 74193, 74194.

UNIT:7 Shift Resister,Buffer and Latches -

9

Shift resister operation, Types of Shift Resistors: SISO, SIPO, PISO and PIPO shift resisters, Bi-directional shift resister.

Shift resister counters: - Ring counter, Johnson counter, up- down counter, Digital Clock Study of IC 7495, 74190.

*Unidirectional Buffer,Bidirectional buffer,Tristate buffer ,Study of IC'S 74LS 244,74 LS 245,Latch 74 LS 373

*Ref.:Microprocessor By R.S.Gaonkar

UNIT:8 Decoders, Encoders, Multiplexer and Demultiplexer: - 9

Basic Binary decoder, 2 to 4 line, 3 to 8 line and 4 to 16 line decoders, BCD in decimal decoder, BCD to seven-segment decoder driver, IC 74138, IC 7447.

Encoder, Decimal to BCD Encoder, Priority Encoder, Study of IC 74147.

Multiplexer: - 2 to 1, 4 to 1, 8 to 1 and 16 to 1 MUX, 1 line – 4 line, 1 line to 8 line and 1 line to 16 line Mux –Tree.

Demultiplexer: - 1 to 4 line, 1 to 8 line & 1 to 16 line DEMUX, Demux Tree.

Study of IC's 74150, 74154.

Books

- Digital Fundamentals Floyd.
- Digital Principles and Applications A.P.Malvino & D.P.Leach (TMH).
- Modern digital Electronics (2nd Edn.) R.P.Jain.
- Fundamentals of Computer V.Rajaraman.

Practicals for B.Sc. Part I (Electronics)

Group A

- 1.i) Identification of active and passive components
- ii) Study of relay (By connecting it to transistor switch)
- iii) LED indicator (Calculation of series resistor for 5V,6V,12V)
2. Verification of Kirchhoff's Laws
3. Verification of Thevenin's & Super Position Theorems
4. Use of CRO (Amplitude, Frequency, Phase measurement)
5. Graphical Determination of α and β
6. Study of diode Characteristics (For Si and Point contact diodes)
7. Study of zener diode (Characteristic and Temperature effect)
8. Study of FET Characteristic
9. Study of Transistor Biasing (Potential divider)
10. Transformer Designing and winding
11. PCB designing and etching

GROUP B

12. Study of Logic Gates
13. Study of Universal Gates (NAND/NOR)
14. Verification of De Morgan's Theorems
15. Study of half and Full Adder
16. Study of RS,D,JK flip-flop
17. Study of counter (Divided by 2,5,10 using 7490)
18. Study of shift register(Left,Right Shift,Ring and Johnsons counter)
19. Study of Multiplexer
20. Study of single digit counter (using 7490,7447,seven segment display)
21. Identification of computer I/O Devices, Preparing own Biodata using MS-WORD)
22. Internet Browsing