REVISED UG SYLLABUS UNDER CBCS
(From Academic Year 2020-21)
PROGRAMME: FOUR YEAR B.Sc.

Domain Subject: **Electronics**
Skill Enhancement Courses (SECs) for Semester V,
From 2022-23 (Syllabus - Curriculum)

Structure of SECs for Semester – V
(To Choose One pair from the Three alternate pairs of SECs)

Courses 6 & 7	Name of the Course	Theory + Practicals Hrs/Week	IA Marks	EA Marks	Credits	Marks (Th+Pr)
6A	Industrial Electronics	3+3	25	75	3+2	100+50
7A	Electronic Instrumentation	3+3	25	75	3+2	100+50

OR

Courses 6 & 7	Name of the Course	Theory + Practicals Hrs/Week	IA Marks	EA Marks	Credits	Marks (Th+Pr)
6B	Embedded systems design	3+3	25	75	3+2	100+50
7B	Consumer Electronics	3+3	25	75	3+2	100+50

OR

Courses 6 & 7	Name of the Course	Theory + Practicals Hrs/Week	IA Marks	EA Marks	Credits	Marks (Th+Pr)
6C	VLSI Design	3+3	25	75	3+2	100+50
7C	Data Communication and Networking	3+3	25	75	3+2	100+50

Note-1: For Semester–V, for the domain subject Electronics, any one of the above three pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C. The pair shall not be broken (A, B, C allotment is random, not on any priority basis).

Note-2: One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.

Semester-wise Revised Syllabus under CBCS, 2020-21
Four Year B.Sc.
Domain Subject: **ELECTRONICS**
IV Year B.Sc., - Semester – V

Course 6A: Industrial Electronics

(Skill Enhancement Course (Elective), 3+2 Credits)
Max. Marks: Theory:100 + Practical:50

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills in using instruments like Rectifiers, Multimeters, Power supplies, Voltage Regulators etc. through hands-on experience.
4. Understand the Principle and operation of different Electronic Heating devices.

***II.* Syllabus:** *(Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)*

Syllabus:

UNIT-I (20 hours)
Rectifiers and filters: Rectifiers– Half wave, full-wave and bridge rectifiers- Efficiency- Ripple factor- Regulation – Harmonic components in rectified output – Types of filters- Choke input (inductor) filter- Shunt capacitor filter- L section and section filters.
Voltage Regulators: Transistor Series voltage regulator - Transistor Shunt voltage regulator – Three terminal regulators (78XX and 79XX).

UNIT-II (10 hours)
Power Supplies: Block diagram of regulated power supply – A simple regulated transistorized power supply (circuit and working) – Principle and working of switch mode power supply (SMPS).

UNIT-III (10 hours)
Voltage Multipliers: Half wave voltage doubler, Full wave voltage doubler, Voltage Tripler circuit diagram and working mentioning of applications of voltage multipliers.

UNIT-IV (10 hours)
Controlled rectifiers: SCR Half wave rectifier circuit, working with wave forms, mathematical analysis for resistive load - SCR Full wave rectifier circuit, working with wave forms, mathematical analysis for resistive load – SCR as inverter parallel and series circuits.

UNIT-V (10 hours)
Heat effects: Resistance, inductance and dielectric heating. Principle of operations and its applications.

Reference Books:

1. Unified Electronics Volume II by J.P Agarwal and Amit Agarwal.
2. Industrial Electronics, S.B. Biswas, Dhanapur Rai & Sons.
3. Industrial Electronics, G.K. Mithal, Khanna Publishers.
4. Electronic Devices and Circuits – G.K. Mithal.
5. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)
6. Microelectronics- J. Millman and A. Grabel - TMH

ELECTRONICS: LAB – 6A

Industrial Electronics

(ANY SIX EXPERIMEMTS SHOULD BE DONE)

1. D.C Power supply and filters.
2. Transistor series regulator
3. Transistor as a shunt regulator
4. Voltage regulator using IC-7805and IC-7905.
5. Voltage doubler using diodes
6. Voltage Tripler using diodes
7. SCR VI characteristics.
8. SCR Series inverter
9. SCR parallel inverter.

Model Question Paper

PAPER - 6A : **Industrial Electronics**
(w.e.f. 2022-23)

Time: 3 hours **Max. Marks: 75**

Part A (5 X 5 = 25 Marks)

Answer any FIVE of the following:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10

Part B (5x10=50 Marks)

Answer the following

11.

(OR)

12.

13.

(OR)

14.

15.

(OR)

16.

17.

(OR)

18.

19.

(OR)

20.

Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: **ELECTRONICS**
IV Year B.Sc. - Semester – V
Course 7A: Electronic Instrumentation (Skill Enhancement Course (Elective), 3+2 Credits) Max. Marks: Theory:100 + Practical:50

I. Learning Outcomes: Students after successful completion of the course will be able to:1.

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills of using instruments like CRO, Function Generator, Multimeter etc. through hands on experience.
4. Understand the Principle and operation of different display devices used in the display systems and different transducers
5. Comprehend the applications of various biomedical instruments in daily life like B.P. meter, ECG, Pulse oxymeter etc. and know the handling procedures with safety and security.

II. Syllabus: *(Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)*

UNIT-I *Introduction To Instruments* (10 hrs)

Types of electronic Instruments - Analog instruments & Digital Instruments, DC Voltmeter and AC Voltmeter, Construction and working of an Analog Multimeter and Digital Multimeter (Block diagram approach), Sensitivity, 3½display and 4½ display Digital multimeters, Basic ideas on Function generator.

UNIT-II *Oscilloscope* (10 hrs)

Cathode Ray Oscilloscope-Introduction, Block diagram of basic CRO, Cathode ray tube, Electron gun assembly, Screen for CRT, Time base operation, Vertical deflection system, Horizontal deflection system, Use of CRO for the measurement of voltage (AC and DC), frequency, phase difference, Different types of oscilloscopes and uses.

UNIT-III *Transducers* (10 hrs)

Classification of transducers, Selection of transducers, Resistive, capacitive & inductive transducers, Resistive and capacitive touch screen transducer used in mobiles, Displacement transducer-LVDT, Piezoelectric transducer, Photo transducer, Digital transducer, Fibre optic sensors

UNIT-IV *Display Instruments* (10 hrs)

Introduction to Display devices, Seven Segment Displays, LED Displays, Construction and operation (Display of numbers),Types of SSDs (Common Anode & Common Cathode type), Limitations of SSDs, Liquid Crystal Displays, Applications of LCD modules.

UNIT-V *Biomedical Instruments* (10 hrs)

Basic operating principles and uses of (i) Clinical thermometer (ii) Stethescope (iii) Sphygmomanometer (iv) ECG machine (v) Radiography (vi) Ophthalmoscope (vii) Ultrasound scanning (viii) Pulse oxymeter (ix) Glucometer, Basic ideas of CT scan and MRI scan.

Reference Books:

1. Electronic Instrumentation by H.S.Kalsi , TMH Publishers
2. Electronic Instrument Hand Book by Clyde F. Coombs , McGraw Hill
3. Introduction to Biomedical Instrumentation byMandeep Singh, PHI Learning.

4. Biomedical Instrumentation and Measurements by Leslie Cromwell ,Prentice Hall India.
5. Electronic Measurements and Instrumentation by Kishor, K Lal, Pearson, New Delhi
6. Electrical and Electronic Measurements by Sahan, A.K., Dhanpat Rai, New Delhi
7. Electronic Instruments and Measurement Techniques by Cooper, W.D. Halfrick, A.B., PHI Learning, New Delhi
8. Web sources suggested by the teacher concerned and the college librarian including reading material.

Course 7A: Electronic Instrumentation– PRACTICAL SYLLABUS

(30 Hrs. Max Marks: 50)

III. Learning Outcomes: On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in Instrumentation Laboratory or Electronic Laboratory.
2. Learn the construction, operational principles of various instruments.
3. Demonstrate skills in handling, Maintenance & troubleshooting of different instruments used in the Labs.
4. Acquire skills in observing and measuring various electrical and electronic quantities.
5. Perform some techniques related to Biomedical Instrumentation and measurement of Certain physiological parameters like body temperature, B.P. and sugar levels etc.

IV. Practical (Laboratory) Syllabus: *(30 hrs. Max marks: 50*)

1.. Familiarisation of digital multimeter and its usage in the measurements of (i) resistance, (ii) current, (iii) AC & DC voltages and for (i) continuity test (ii)diode test and (iii) transistor test.

2.Measure the AC and DC voltages, frequency using a CRO and compare the values Measured with other instruments like Digital Multimeter.

3. Formation of Sine, Square wave signals on the CRO using Function Generator and measure their frequencies. Compare the measured values with actual values.
4. Display the numbers from 0 to 9 on a single Seven Segment Display module by Applying voltages.
5. Display the letters **a** to **h** on a single Seven Segment Display module by applying voltages.
6. Measurement of body temperature using a digital thermometer and list out the error and corrections.
7. Measurement of Blood Pressure of a person using a B.P. meter And record the values and analyze them.
8. Get acquainted with an available ECG machine and study the ECG pattern to understand the meaning of various peaks

9. Observe and understand the operation of a Digital Pulse oxymeter and measure the pulse rate of different people and understand the working of the meter.

Lab References**:**

1. Electronic Measurement and Instrumentation by J.P. Navani. ,S Chand & Co Ltd
2. Principles of Electronic Instrumentation by A De Sa, Elsevier Science Publ.
3. Electronic Measurements and Instrumentation by S.P.Bihari, YogitaKumari, Dr. Vinay Kakka, Vayu Education of India.
4. Laboratory Manual For Introductory Electronics Experiments by Maheshwari, New Age
5. International (P) Ltd., Publishers.
6. Electricity-Electronics Fundamentals: A Text-lab Manual by Paul B. Zbar
7. ,Joseph Sloop, & Joseph G. Sloop, McGraw-Hill Education.
8. Web sources suggested by the teacher concerned.

Co-Curricular Activities

(a) Mandatory:(*Training of students by the teacher in field related skills: (lab:10 + field:05*)

1.**For Teacher**: Training of students by the teacher in the laboratory/field for not less than 15 hours on the field techniques/skills of understanding the operation, Maintenance and utility of various electrical and electronic instruments both in the Laboratory as well as in daily life.

For Student: Students shall (individually)visit a local electrical and electronics shop or small firm to familiarize themselves with the various electrical and electronic instruments available in the market and also to understand their functionality, principle of operation and applications as well as the troubleshooting of these instruments.(Or) The student shall visit a diagnostic centre and observe the ECG machine and the ECG pattern(Or) Student shall visit a diagnostic centre and observe the CT scan and MRI scan.(Or) Students shall visit a mobile smartphone repair shop and observe the different components on the PCB(Motherboard), different ICs (chips) used in the motherboard and troubleshooting of touch screens in smartphones.

Observations shall be recorded in a hand-written Fieldwork/Project work not exceeding 10 pages in the given format to be submitted to the teacher.

2. Max marks for Fieldwork/Project work: 05.

3.Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of a place visited, observations, findings and acknowledgments*.

4.Unit tests (IE)

Suggested Co-Curricular Activities

1. Training of students by related industrial/technical experts.
2. Assignments (including technical assignments like identifying different measuring instruments and tools and their handling, operational techniques with safety and security.
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Make your own stethoscope at home.
5. Making a seven-segment display at home.
6. Preparation of videos on tools and techniques in various branches of instrumentation.

7. Collection of material/figures/photos related to products of Measuring Instruments, Display Modules and Biomedical Instruments and arrange them in a systematic way in a file.

8. Visits to Instrumentation Laboratories of local Universities or Industries like Cement, Chemical or Sugar Plants etc. or any nearby research organizations, private firms, etc.

9. Invited lectures and presentations on related topics by Technical /industrial experts

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Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: **ELECTRONICS**
IV Year B.Sc., - Semester – V
Course 6B: Embedded systems design (Skill Enhancement Course (Elective), 3+2 Credits) Max. Marks: Theory:100 + Project:50

UNIT 1: (10Hrs)

Introduction to Embedded Systems:
Embedded systems overview, Design Challenge, Processor Technology, IC Technology, and Design Technology.

UNIT 2: (15Hrs)

Custom Single Purpose Processor – Hardware Development: Introduction, Combinational logic, Sequential logic, Custom Single Purpose Processor Design, RT-Level Custom Single-Purpose Processor.

UNIT 3: (15Hrs)

General Purpose Processor – Software Development: Introduction, Basic Architecture, Operation, Programmer's View, ASIPs, and Development Environment: Host and Target Machines, Linker / Locators for Embedded Software, Getting Embedded Software into the target system. Debugging Techniques: Testing on your Host Machine, and Instruction Set Simulators.

UNIT 4: (10Hrs)

RTWA for Embedded Systems: Introduction, Timers, Counters and Watchdog Timers, UART, Pulse Width Modulators, LCD Controllers, Keypad Controllers, Stepper Motor Controllers, Analog – to – Digital Converters, and Real Time Clocks.

UNIT 5: (10Hrs)

Advanced Communication Principles:Parallel Communication, Serial Communication, Wireless Communication, Serial Protocols: I^2C, CAN, FireWire, and USB. Parallel Protocols: PCI BUS and ARM BUS. Wireless Protocols: IrDA, Bluetooth, and IEEE 802.11.

TEXT BOOKS:

1. Embedded System Design – A Unified Hardware / Software Introduction By Frank Vahid / Tony Givargis – WILEY EDITION.

2. Embedded Systems Architecture, Programming and Design – 2nd Edition By Raj Kamal – Tata McGraw-Hill Education.

REFERENCES:

1. An Embedded Software Premier - David E- Siman, PEARSON
2. Education Embedded / real - time systems - DR. K.V.K.K. Prasad, dreamtech
3. The art of programming Embedded systems, Jack G. Ganssle, academic press
4. Intelligent Embedded systems, Louis L. Odette, Adison Wesly, 1991

Model Question Paper

PAPER-6B : **Embedded systems Design**

(w.e.f 2022-23)

Time: 3 hours Max. Marks: 75

Part A (5 X 5 = 25 Marks)

Answer any FIVE of the following:

1. What are the components of an Embedded hardware system.
2. Explain the design challenges of Embedded systems.
3. Explain various steps to design a custom single-purpose processor.
4. Explain combinational logic circuit design.
5. Write a short note on the linker for embedded systems.
6. Briefly explain the operation of a general-purpose processor.
7. What is Watchdog Timer? Explain.
8. Explain the working of Real-time Clocks in embedded systems.
9. Write a short note on the I2C protocol.
10. Explain the working of Bluetooth protocol for wireless communication.

Part B (5x10=50 Marks)

Answer the following:

11. Draw the block diagram of an embedded system. Explain the features of Embedded Systems.

(OR)

12. Explain various technologies involved in designing an embedded system.
13. Explain (a) Combination logic and (b) Sequential logic circuits

(OR)

14. Explain in detail about RT Level custom single purpose processor.
15. Explain in detail about embedded software development tools.

(OR)

16. Explain various debugging techniques used in Embedded Systems.
17. Define and explain Universal asynchronous receiver transmitter (UART).

(OR)

18. Explain the working of Stepper motor controller for embedded systems.
19. Distinguish between parallel and serial communication Principles. Explain USB Serial Protocol.

(**OR)**

20. Write a short note on (a)PCI BUS and (b) ARM BUS

Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: **ELECTRONICS**
IV Year B.Sc., - Semester – V
Course 7B: Consumer Electronics
(Skill Enhancement Course (Elective), 3+2 Credits)
Max. Marks: Theory:100 + Practical:50

Learning Outcomes:

- To study Microwave ovens – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study washing machines – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Air conditioners and refrigerators – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Home/Office digital devices – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Digital access devices like – block diagram - working - types – wiring and safety instructions. – care and cleaning

Unit – I(12hrs)

Microwave Ovens – Microwaves (Range used in Microwave ovens) – Microwave oven block diagram – LCD timer with alarm – Single-Chip Controllers – types of Microwave oven – Wiring and Safety instructions – care and Cleaning.

Unit – II(12hrs)

Washing Machines – Electronic controller for washing machines – Washing machine hardware and software – Types of washing machines – Fuzzy logic washing machines Features of washing machines.

Unit – III(12hrs)

Air Conditioners And Refrigerators - Air Conditioning – Components of air conditioning systems – All water air conditioning systems – All air conditioning systems – Unitary and central air conditioning systems – Split air conditioners.

Unit – IV(12hrs)

Home/Office Digital Devices – Fascimile machine – Xerographic copier – calculators – Structure of a calculator – Internal organization of a calculator – Servicing electronic calculators – Digital clocks – Block diagram of a digital clock.

Unit – V(12hrs)

Digital Access Devices – Digital computer – Internet access – online ticket reservation – functions and networks – barcode scanner and decoder – Electronic Fund Transfer – Automated Teller Machines(ATMs) – Set-Top boxes – Digital cable TV – Video on demand.

TEXTBOKS:

1. S.P. Bali, Consumer Electronics – Pearson Education, New Delhi,2005.
2. R.G. Gupta Audio and Video systems Tata McGraw Hill (2004)

Learning outcomes:

- The Student can gain a good knowledge of microwave ovens and implement them in practical applications.
- The Student can gain a good knowledge of Washing Machines and implement in practical applications.
- The Student can gain a good knowledge of Air conditioners and Refrigerators and implement them in practical applications.
- The Student can gain a good knowledge of Digital access devices and implement in practical applications.
- Ability to measure strain, displacement, velocity, angular velocity , temperature, pressure Vacuum, and Flow.

Course 7B: Consumer Electronics

CONSUMER ELECTRONICS LAB

(At least two Activities should be done)

1. Study of PA systems for various situations – Public gathering, closed theatre/ Auditorium, Conference room, Prepare Bill of Material(Costing)
2. Installation of Audio/Video systems – site preparation, electrical requirements, cables and connectors
3. Market Survey of products (at least one from each module)
4. Identification of block and tracing the system. Assembly and Disassembly of system using Toolkit
5. Assembly and Disassembly of system and printer.

NOTE: one activity as directed in practical course is equivalent to 4 experiments.

Model Question Paper

PAPER- 7B : CONSUMER ELECTRONICS
(w.e.f 2022-23)

Time: 3 hours Max. Marks: 75

Part A (5 X 5 = 25 Marks)

Answer any FIVE of the following:

1. Explain the microwave oven safety instructions.
2. What are the uses of a microwave oven?
3. Explain the features of the washing machine.
4. Explain the different types of washing machines.
5. Explain the working of the air conditioning system.
6. What is a unitary air conditioning system.
7. How servicing the electronic calculators.
8. What is facsimile machine? And give the two uses of it.
9. Explain the barcode scanner system.
10. How transfer the fund using ATM?

Part B (5x10=50 Marks)

Answer the following:

11. Draw the block diagram of the microwave oven and explain each block.

(OR)

12. Explain the LCD timer with alarm in the washing machine.
13. What is FUZZY logic washing machine.

(OR)

14. Explain the hardware details of washing machine.
15. Explain the different components of air-condition system.

(OR)

16. Explain the working of split air condition.
17. Draw the block diagram of digital clock and explain it.

(OR)

18. Draw the structure of calculator. And explain each one.
19. What is network and explain its online ticket reservation procedure.

(OR)

20. Explain the details about digital cable TV.

Semester-wise Revised Syllabus under CBCS, 2021 - 22

Domain Subject: **ELECTRONICS**

IV Year B.Sc., - Semester – V

Course 6C: VLSI DESIGN

(Skill Enhancement Course (Elective), 3+2 Credits)

Max. Marks: Theory:100 + Practical:50

UNIT-I (12 hrs)

Integrated Circuit- Definition, Classification's, and Advantages of IC's – MOS Transistors: Enhancement type, Depletion type, Modes of NMOS – CMOS, Fabrications: n-Well, p-Well.

UNIT-II (12 hrs)

NMOS Inverter – CMOS inverter – VLSI Design Flow: Design Specification's Design Entry – Examples of (Circuit Diagrams only) NMOS, PMOS and CMOS.

UNIT-III (12 hrs)

Basic logic gates in CMOS – Complex logic gate: Two, Three inputs of CMOS NAND gate – Combinational Logic: Two and Three inputs of CMOS NOR gate – Compound gates in CMOS.

UNIT-IV (10 hrs)

VHDL: Brief History, Logical, Relational, Arithmetic, Shift and Rotate Operators, Data types.

Verilog HDL: Brief History, Logical, Relational, Arithmetic, Shift and Rotate Operators, Data types
– Comparison of VHDL and Verilog HDL.

UNIT-V (14 hrs)

Data – Flow Description's and HDL programs:-

Basic Logic Gates, Universal Gates, Half-Adder, Multiplexer, Magnitude Comparator, Binary Adder.

TEXT BOOKS

1. VLSI Design by Vilas S.Baged.
2. VHDL and Verilog programming By Nazeih M.Botros.
3. VLSI Design By A.Albert Raj and T.Latha.

ELECTRONICS : LAB – 6C

VHDL / Verilog HDL LAB

(any six experiments should be done)

1) BASIC GATES CIRCUIT
2) UNIVERSAL GATES
3) HALF –ADDER
4) FULL –ADDER
5) MULTIPLEXER
6) DECODER
7) S-R LATCH
8) D-LATCH
9) MAGNITUDE COMPARATOR
10) BINARY ADDER

Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: **ELECTRONICS**
IV Year B.Sc., - Semester – V

Course 7C: DATA COMMUNICATION AND NETWORKING

(Skill Enhancement Course (Elective), 3+2 Credits)
Max. Marks: Theory:100 + Practical:50

UNIT –I (12 Hrs):

Data Communication and its Components – Introducing of Network, Types of Networks: Personal Area Network, wide Area Network.

UNIT-II (14 hrs):

Network Topologies: Bus Topology, Star Topology, Ring Topology, Mesh Topology, Tree Topology, Hybrid, Topology.

UNIT-III (10 Hrs):

Transmission Media's - Guided Media: Twisted pair Cable, Coaxial Cable, Optical Fiber Cable. Un-Guide Media: Radio Waves, Microwaves, Infrared.

UNIT-IV (10 Hrs):

Data Transmissions: Digital – To – Digital Conversion (line coding only), Analog – To – Digital Conversion (PCM only), Digital – To – Analog (ASK only) Analog – To – Analog Transmission (AM only) – Transmission Modes (Parallel and Serial).

UNIT – V (14 Hrs):

Frequency Division Multiplexing, Time Division Multiplexing Wave Division Multiplexing. Modems: Traditional Modems, Cable Modems.

TEXT BOOKS

1. Data communication and Networking (2 Edition) By Behrouz A.Forouzan.
2. Data and Communication by Stallings Williams.
3. Computer Networks By Kurose James F

ELECTRONICS: LAB – 7C

DATA COMMUNICATION AND NETWORKING

(Any Six Experiments Should Be Done)

1. TO STUDY DIFFERENT TYPES OF TRANSMISSION MEDIA.
2. TO STUDY THE SERIAL INTERFACE USING RS-232.
3. TO STUDY LAN USING STAR TOPOLOGY
4. TO STUDY LAN USING BUS TOPOLOGY
5. TO STUDY LAN USING TREE TOPOLOGY
6. TO STUDY CONFIGURE MODEM OF COMPUTER
7. TO STUDY CONFIGURE HUB/SWITCH
8. Analog to Digital Conversion
9. Digital to Analog conversion