Syllabus
ELECTRONICS
(UG courses)
Admitted Batch 2008-2009

May 2008
A.P. State Council of Higher Education
# SUBJECT COMMITTEE

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>University/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prof. P. Narasimha Reddy</td>
<td>Sri Venkateshwara University</td>
</tr>
<tr>
<td>2.</td>
<td>Prof. M. Poornachander Rao</td>
<td>Andhra University</td>
</tr>
<tr>
<td>3.</td>
<td>Prof. K. Mala Kondaiah</td>
<td>Sri Krishnadevaraya University</td>
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<tr>
<td>4.</td>
<td>Prof. G. Sattaiah</td>
<td>Kakatiya University</td>
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<tr>
<td>5.</td>
<td>Prof. S. P. Mallikarjun Rao</td>
<td>Osmania University</td>
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<tr>
<td>6.</td>
<td>Dr. D. Krishna Rao</td>
<td>Nagarjuna University</td>
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<tr>
<td>7.</td>
<td>Sri. K. S. Murthy</td>
<td>ECIL, Hyderabad</td>
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<tr>
<td>8.</td>
<td>Dr. B. Sreenivasulu</td>
<td>Govt. College, Ananthapur</td>
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<tr>
<td>9.</td>
<td>Dr. C. Sivaraman</td>
<td>Pragathi Mahavidyalaya, Hyderabad</td>
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<tr>
<td>10.</td>
<td>Prof. M. Narasimha Chary</td>
<td>Osmania University</td>
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</table>

*Deputy General Manager*

*Coordinator*
# B.Sc. Courses (Structure)

## First year:

<table>
<thead>
<tr>
<th>S.no.</th>
<th>Subject</th>
<th>Hrs per week</th>
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<tbody>
<tr>
<td>1.</td>
<td>English language including communication skills</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Second language</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Core1-I</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Core2-I</td>
<td>4</td>
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<tr>
<td>5.</td>
<td>Core3-I</td>
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<tr>
<td>6.</td>
<td>Core1-lab I</td>
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<tr>
<td>7.</td>
<td>Core2-lab I</td>
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<td>8.</td>
<td>Core3-lab I</td>
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<tr>
<td>9.</td>
<td>Foundation course</td>
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<tr>
<td>10.</td>
<td>Computer skills</td>
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<td><strong>Total</strong></td>
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## Second year:

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<tr>
<th>S.no.</th>
<th>Subject</th>
<th>Hrs per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>English language including communication skills</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Second language</td>
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<tr>
<td>3.</td>
<td>Core1-II</td>
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<tr>
<td>4.</td>
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<td>6.</td>
<td>Core1-lab II</td>
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<tr>
<td>7.</td>
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<tr>
<td>8.</td>
<td>Core3-lab II</td>
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<tr>
<td>9.</td>
<td>Environmental studies</td>
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<tr>
<td>10.</td>
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## Third year:

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<th>Subject</th>
<th>Hrs per week</th>
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<td>1.</td>
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<tr>
<td>2.</td>
<td>Core1-IV</td>
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<tr>
<td>3.</td>
<td>Core2-III</td>
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<tr>
<td>4.</td>
<td>Core2-IV</td>
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<tr>
<td>5.</td>
<td>Core3-III</td>
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<tr>
<td>6.</td>
<td>Core3-IV</td>
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<td>7.</td>
<td>Core1-lab III</td>
<td>3</td>
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<tr>
<td>8.</td>
<td>Core1-lab IV</td>
<td>3</td>
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<tr>
<td>9.</td>
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<tr>
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<td>3</td>
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<tr>
<td>11.</td>
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<td>3</td>
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<tr>
<td>13.</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>39</strong></td>
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</table>
# B.Sc (Electronics) – Scheme of instruction

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Year</th>
<th>Paper</th>
<th>Hours/week</th>
<th>Total hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>A. THEORY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01</td>
<td>First Year</td>
<td><strong>Paper-I</strong> Circuit Analysis and Electronic Devices</td>
<td>4hrs/ Week</td>
<td>120 Hours</td>
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<tr>
<td>02</td>
<td>Second Year</td>
<td><strong>Paper-II</strong> Analog Circuits and Communications</td>
<td>4hrs/ Week</td>
<td>120 Hours</td>
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<tr>
<td>03</td>
<td>Third Year</td>
<td><strong>Paper –III</strong> Digital Electronics and Microprocessor.</td>
<td>3hrs/ Week</td>
<td>90 Hours</td>
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| 04    | Third Year | Paper –IV (Electives) Any one of the following  
  i) **Paper – IVA** Embedded Systems and Applications  
  ii) **Paper – IVB** Digital Design using VHDL | 3hrs/ Week | 90 Hours    |
|       |            | **B. PRACTICALS**                          |            |             |
| 05    | First Year | **Paper – I:** Circuit Analysis and Electronic Devices Lab | 3hrs/Week  | 90 Hours (30Sessions) |
| 06    | Second Year| **Paper – II:** Analog Circuits and Communication Lab | 3hrs/ Week | 90 Hours (30Sessions) |
| 07    | Third Year | **Paper – III:** Digital Electronics and Microprocessor Lab | 3hrs/ Week | 90 Hours (30 Sessions) |
| 08    | Third Year | Paper – IV (Electives) Any one of the following  
  Paper - IV (A): Embedded Systems and Applications Lab  
  Paper - IV (B): Digital design Using VHDL Lab | 3 hrs/Week | 90 Hours (30 Sessions) |
PAPER-I  Circuit Analysis and Electronic Devices. (120 hours)

UNIT-I (30 hours)

*AC Fundamentals*: The Sine wave – Average and RMS values – The J operator – Polar and rectangular forms of complex numbers – Phasor diagram – Complex impedance and admittance.

*Passive networks*: Concept of voltage and current sources – KVL and KCL- Application to simple circuits (AC and DC) consisting of resistors and sources (one or two) - Node voltage analysis and method of mesh currents.

*Network theorems (DC and AC)*: Superposition Theorem – Thevenin’s Theorem – Norton’s Theorem – Maximum power transfer Theorem – Millman Theorem- Reciprocity Theorem – Application to simple networks.

UNIT- II (30 hours)


UNIT-III (30 hours)

*PN Junction*: Depletion region – Junction capacitance – Diode equation (no derivation) – Effect of temperature on reverse saturation current – construction, working. V-I characteristics and simple applications of
  i) Junction diode ii) Zener diode iii) Tunnel diode and iv) Varactor diode.

*Bipolar Junction Transistor (BJT)*: PNP and NPN transistors–current components in BJT – BJT static characteristics (Input and Output) – Early effect- CB, CC,CE configurations (cut off, active, and saturation regions) CE configuration as two port network – h-parameters – h-parameter equivalent circuit. Experimental arrangement to study input and output characteristics of BJT in CE configuration. Determination of h-parameters from the characteristics. Biasing and load line analysis – Fixed bias and self bias arrangement.
UNIT-IV (30 hours)

Field Effect Transistor (FET): Structure and working of JFET and MOSFET – output and transfer characteristics – Experimental arrangement for studying the characteristics and to determine FET parameters. Application of FET as voltage variable resistor and MOSFET as a switch – Advantages of FET over transistor.


Silicon Controlled Rectifier (SCR): Structure and working of SCR. Two transistor representation, Characteristics of SCR. Experimental set up to study the SCR characteristics. Application of SCR for power control.

Photo Electric Devices: Structure and operation of LDR, Photo voltaic cell, Photo diode, Photo transistors and LED.

(NOTE: Solving related problems in all the Units)

Reference Books:

2. Network lines and fields- Ryder- Prentice Hall of India (PHI)
3. Circuit analysis - P.Gnanasivam- Pearson Education
4. Circuits and Networks - A.Sudhaksr & Shyammohan S. Palli - TMH
5. Network Theory - Smarajit Ghosh - PHI
6. Electronic Devices and Circuits-Millman and Halkias - TMH
7. Electronic Devices and Circuits-Allen Mottershead - PHI
8. Principles of Electronics- V.K. Mehta and Rohit Mehta - S Chand &Co
10. Pulse digital switching waveforms -Millman &Taub - TMH.
11. Applied Electronics- R.S.Sedha - S Chand &Co
12. A First course in Electronics- AA Khan & KK Day- PHI
B.Sc I Year - Electronics

PRACTICALS PAPER-I (90 hours-30 Sessions)

Circuit Analysis and Electronic devices Lab

1. Measurement of peak voltage, frequency and phase using CRO.
2. Thevenin’s theorem – verification.
4. Maximum power transfer theorem – verification.
5. CR and LR circuits- Frequency response- (Low pass and High pass).
6. CR and LR circuits - Differentiation and integration - tracing of waveforms.
7. LCR–Series resonance circuit–Frequency response–Determination of f_o, Q and band width.
8. To draw volt-ampere characteristics of Junction diode and determine the cut-in voltage, forward and reverse resistances.
10. Voltage regulator using Zener diode
11. BJT input and output characteristics (CE configuration) and determination of ‘h’ parameters.
12. FET – Characteristics and determination of FET parameters.
13. UJT as relaxation oscillator.
14. LDR- characteristics.
15. SCR Volt-ampere characteristics.

Note: Student has to perform any 12 experiments.
ANDHRA UNIVERSITY
ELECTRONICS SYLLABUS ACADEMIC YEAR  2009-10

B.Sc II Year- Electronics

PAPER–II  Analog Circuits and Communications (120 hours)

UNIT- I (30 hours)

*Power Supplies*: Rectifiers– Halfwave, fullwave 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 π section filters – Block diagram of regulated power supply - Series and shunt regulated power supplies – Three terminal regulators (78XX and 79XX) – Principle and working of switch mode power supply (SMPS).

UNIT-II (30 hours)

*RC Coupled Amplifier*: Analysis and frequency response of single stage RC coupled CE amplifier.

*Feedback*: Positive and negative feedback- Effect of feedback on gain, band width, noise, input and output impedances.


UNIT-III (30 hours)

UNIT-IV (30 hours)

Communications: Need for modulation-Types of modulation- Amplitude, Frequency and Phase modulation.
Amplitude modulation-side bands- modulation index- square law diode modulator- Demodulation- diode detector.
Frequency modulation working of simple frequency modulator- Ratio detection of FM waves- Advantages of frequency modulation.
AM and FM radio receivers [block diagram approach].

(NOTE: Solving related problems in all the Units)

Reference Books:

1. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)
2. Microelectronics- J. Millman and A. Grabel - TMH
4. Operational Amplifiers and Linear Integrated Circuits- K. Lalkishore - Pearson Education
5. Analog Electronics- L.K. Maheswari and M.M.S. Anand- PHI
6. Applied Electronics- R.S.Sedha- S Chand &Co
7. Principles of Electronics- V.K. Mehta and Rohit Mehta - S Chand &Co
10. Electronic Communication -D. Roddy & J. Coolen- PHI
ANDHRA UNIVERSITY

B.Sc II Year - Electronics

PRACTICALS PAPER-II (90 hours - 30 Sessions)

Analog Circuits and Communications Lab

1. D.C Power supply and filters.
3. OP-Amp (IC 741) as
   a) Inverting amplifier.
   b) Non-inverting amplifier.
   c) Comparator.
4. OP-Amp (IC 741) as
   a) Integrator.
   b) Differentiator.
5. OP-Amp as Wien bridge oscillator.
8. Voltage regulator using IC- 7805and IC-7905.
9. AM modulator and Demodulator.
10. FM modulator.
11. Simulation experiments using appropriate electronic circuit simulation software.
    a) RC coupled amplifier.
    b) Wien bridge oscillator.
    c) Astable multivibrator.
    d) Amplitude Modulation.
    e) Frequency Modulation.

*Note: Student has to perform the following experiments*

(1) Any 7 experiments among the experiment numbers1to10.
(2) Experiment Number 11 (a,b,c,d and e) is compulsory

STUDENTS ARE ENCOURAGED TO DO A SMALL PROJECT WORK DURING SECOND YEAR
ANDHRA UNIVERSITY

ELECTRONICS SYLLABUS ACADEMIC YEAR  2010-11

B.Sc III Year - Electronics

PAPER – III  Digital Electronics and Microprocessor (90 hours)

UNIT-I (23 HOURS)

Introduction to number systems, Logic gates OR, AND, NOT, X-OR, NAND, NOR gates - Truth tables – Positive and negative logic – Logic families and their characteristics – RTL, DTL, ECL, TTL and CMOS. – Universal building blocks NAND and NOR gates. Laws of Boolean algebra De Morgan’s Theorems – Boolean identities – Simplification of Boolean expressions– Karnaugh Maps – Sum of products (SOP) and Product of sums (POS).

UNIT-II (22 HOURS)


UNIT-III (23 HOURS)


Instruction set of 8085, instruction and data formats- classification of instructions – addressing modes. Assembly language programming examples of 8 and 16 bit addition, subtraction, multiplication and division. Finding the largest and smallest in a data array. Programming examples using stacks and subroutines.
UNIT-IV (22 HOURS)

*Interfacing peripherals and applications:* Programmable peripheral interface (8255) - D/A and A/D converters and their interfacing to the Microprocessor. Stepper motor control-seven segment LED.

*(NOTE: Solving related problems in all the Units)*

**Reference Books:**

1. Digital Principles and Applications- Malvino & Leach- TMH
2. Digital Fundamentals – F.Loyd & Jain- Pearson Education
5. Digital Systems – Rajkamal- Pearson Education
6. Digital Electronic Principles and Integrated Circuits- Maini- Willey India
7. Digital Electronics- Gothman-
10. Introduction to Microprocessor – Aditya. P. Mathur- TMH
11. Microprocessors and Microcontrollers Hardware and Interfacing- Mathivannan- PHI
A) Digital Experiments

1. Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR gates (By using 7400-series)
2. Construction of gates using NAND, NOR gates.
3. Construction of Half and Full adders and verifying their truth tables.
4. Operation and verifying truth tables of flip-flops- RS, D, and JK using ICs.
5. Construction of Decade counters (7490).
6. Driving Stepper motor using JK flip-flop
7. Simulation experiments using appropriate electronic circuit simulation.
   a) 4-bit parallel adder using combinational circuits.
   b) Decade counter using JK flip flops.
   c) Up/Down counter using JK flip flop.
   d) Up/Down counter using 7493.

B) MICROPROCESSOR (Software)

1. Binary addition & subtraction. (8-bit & 16-bit)
3. Picking up largest/smallest number.
5. Decimal addition (DAA) & Subtraction.
6. Time delay generation

C) MICROPROCESSOR (Hardware)

1. Interfacing R-2R Ladder network (DAC) (4 bits) to generate waveforms.
2. Interfacing a stepper motor and rotating it clockwise/anti clockwise through a known angle.
3. Interfacing a seven segment display.
4. Interfacing ADC for temperature measurement.

Note: Student has to perform the following experiments:

(i) In Section (A) any four experiments among experiment numbers 1to 6
(ii) Experiment Number 7 (a, b, c and d) is compulsory
(iii) All experiments in section (B)
(iv) Any two experiments in section (C).

STUDENTS ARE ENCOURAGED TO DO A SMALL PROJECT WORK DURING THIRD YEAR
Unit– I (22 Hours)

The 8051 Microcontroller

*Introduction to microcontrollers and embedded systems*: Overview and block diagram of 8051. Architecture of 8051. Program counter and memory organisation. Data types and directives, Flag bits and PSW Register, Register banks and Stack; Pin diagram, Port organisation, I/O Programming, Bit manipulation. Interrupts and timer.

Unit–II (23 Hours)

Addressing modes, instruction set and assembly language programming of 8051

Addressing modes and accessing memory using various addressing modes. Instruction set: Arithmetic, Logical, Single Bit, Jump, Loop and Call Instructions and their usage. Time Delay Generation and Calculation; Timer/Counter Programming. Programming examples: Addition, multiplication, subtraction, division, arranging a given set of numbers in ascending / descending order, picking the smallest / largest number among a given set of numbers, Accessing a specified port terminal and generating a rectangular waveform.

Unit – III (22 Hours)

Interfacing of peripherals to Microcontroller

Interfacing of - PPI 8255, DAC, ADC. Serial communication- modes and protocols
Unit – IV (23 Hours)

Applications of Embedded Systems

Temperature measurement, displaying information on a LCD, Control of a Stepper Motor, Interfacing a keyboard and generation different types of waveforms.

Reference Books:

1. The 8051 Microcontrollers and Embedded Systems – By Muhammad Ali Mazidi and Janice Gillispie Mazidi- Pearson Education Asia, 4th Reprint, 2002
4. Programming and Customizing the 8051 Microcontroller – By Myke Predko- TMH, 2003
5. Design with Microcontrollers By - J B Peatman- TMH.
6. The 8051 Microcontroller - Programming, interfacing and applications by Howard Boyet and Ron Katz - (MII) Microprocessors Training Inc.
7. The concepts & features of Microcontrollers by Rajkamal - Wheeler Pub.
Electronics 16 of 19

B.Sc III Year – Electronics

Elective Paper – IV (A): PRACTICALS (90 Hours- 30 Sessions)

Embedded Systems and Applications Lab

Microcontroller Experiments using 8051 kit

1. Multiplication of two numbers using MUL command (later using counter method for repeated addition)
2. Division of two numbers using DIV command (later using counter method for repeated subtraction)
3. Pick the smallest number among a given set of numbers
4. Pick the largest number among a given set of numbers
5. Arrange ‘n’ numbers in ascending order
6. Arrange ‘n’ numbers in descending order
7. Generate a specified time delay
8. Interface a ADC and a temperature sensor to measure temperature
9. Interface a DAC & Generate a stair case wave form – with step duration and no. of steps as variables
10. Flash a LED connected at a specified output port terminal
11. Interface a stepper motor – and rotate it clock wise or anti clock wise through given angle steps
12. Using Keil software write a program to pick the smallest among a given set of numbers
13. Using Keil software write a program to pick the largest among a given set of numbers
14. Using Keil software write a program to arrange a given set of numbers in ascending order
15. Using Keil software write a program to arrange a given set of numbers in descending order
16. Using Keil software write a program to generate a rectangular wave form at a specified port terminal

Note: Student has to perform the following experiments

(1) 8 Experiments among experiment numbers 1 to 11
(2) Experiment Numbers from 12 to 16 are compulsory

STUDENTS ARE ENCOURAGED TO DO A SMALL PROJECT WORK DURING THIRD YEAR
ANDHRA UNIVERSITY
ELECTRONICS SYLLABUS ACADEMIC YEAR 2010-11

B.Sc III Year – Electronics

Elective Paper – IV (B) : Digital Design Using VHDL  (90 Hours)

UNIT – I (22 Hours)

Introduction & Behavioural Modeling

Introduction to HDLs: Difference between HDL and other software languages – Different HDLs in vogue. Overview of digital system design using HDL

Basic VHDL Language Elements: Identifiers, Data objects, scalar and composite data types, Operators


UNIT – II (23 Hours)

Data Flow and Structural Modeling

Data Flow Modeling with examples: Concurrent signal assignment statement, Concurrent versus sequential signal assignment, Delta delays, Multiple drivers, Conditional signal assignment statement, selected signal assignment statement, concurrent assertion statement.

Structural Modeling with examples: Component declaration, Component instantiation and examples, Direct instantiation of component.

UNIT – III (23 Hours)

Subprograms and Packages

Subprograms and Overloading: Functions and procedures with simple examples - subprogram overloading, Operator overloading.
**Packages and Libraries:** Package declaration, package body, design file, design libraries, order of analysis, implicit visibility, explicit visibility, library clause and use clause.

**Advanced Features:** Entity statements, Generate statements, Attributes, Aggregate targets, ports and their behaviour.

**UNIT – IV (22 Hours)**

**Simulation and Hardware modeling**

**Model Simulation:** Simulation – Writing a Test Bench for a Half and a Full adder.

**Hardware Modeling Examples:** Modeling entity interfaces, Modeling simple elements, Different styles of modeling, Modeling regular structures, Modeling delays, Modeling conditional operations, Modeling a clock divider and a pulse counter.

**Reference Books**

B.Sc III Year – Electronics

Elective Paper – IV (B): PRACTICALS (90 Hours- 30 Sessions)
Digital design Using VHDL Lab

VHDL – Program entry, simulation & implementation (CPLD/ FPGA) using appropriate HDL Software for the following circuits.

1. All types of logic gates (Data Flow)
2. Half adder (Data flow, Structural and Schematic)
3. Full adder (Data flow, Structural and Schematic)
4. Half subtractor (Data flow, Structural and Schematic)
5. Full subtractor (Data flow, Structural and Schematic)
6. Two control input Mux – using case
7. Two control input Mux – using conditional signal assignment
8. Two control input Mux – using selected signal assignment
9. Two control input Dmux - using case
10. BCD to seven segment decoder (schematic)
11. Modeling a RS-FF with assertion, report & different levels of severity (Behavioural)
12. Modeling a BCD Counter (Top level behavioural)
13. Writing a Test Bench for a Half adder
14. Writing a Test bench for Full Adder

Note: Student has to perform any 12 experiments

STUDENTS ARE ENCOURAGED TO DO A SMALL PROJECT WORK DURING THIRD YEAR

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