Course Code	Allied-IA	T/P	C	H/W
22BELA1	**Computer Electronics- I A**	T	3	3

Objectives	➢ To learn various types of number system and to perform arithmetic and logical operations on the various number systems. ➢ To Study Boolean algebra and Demorgan's theorem and how to apply the algebra and theorem to minimize the logical devices using Karnaugh map ➢ To study the various combinational logical circuits and its operations using truth table to develop the skill for digital logic design. ➢ To study about various types of flip-flops to know their operations and to develop the skill to design sequential logical circuits
Unit - I	**Minimization Techniques:** Number Systems – Floating Point Representation – 1's and 2's Complements – Signed number Addition and Subtraction – Codes – Boolean Algebra – Demorgan's Theorem – Canonical and Standard Forms – Minimization Techniques – Simplification of Boolean Functions using Karnaugh Map.
Unit - II	**Combinational Logic Design:** Logic Gates – Universal Gates – Half Adder – Full Adder – Half Subtractor – Full Subtractor – Parallel Binary Adder and Subtractor (7483) – BCD Adder – Binary Multiplier and Divider – Multiplexers – De multiplexers –(74138) 3 to 8 Decoder – 74148 Priority Encoder – BCD to Seven Segment Decoder 7447/48 – Parity Generator and Checkers .
Unit-III	**Flip-Flops:** Basic Latch circuits – S-R Flip-Flop – D Flip-Flop – J-K Flip-Flop – T Flip-Flop – Triggering of Flip-Flops – Asynchronous Inputs in Flip-Flops – Master Slave J-K Flip Flops – Racing Condition
Unit-IV	**Registers:** 4- bit Shift Register – SISO Shift Register – SIPO Shift Register – PISO Shift Register – PIPO Shift Register
Unit-V	**Counters: Asynchronous Counters**: Ripple Counter — Ring Counter- Decade Counter – Up/ Down Counter **Synchronous Counters:** Up/Down Counter – Design of MOD- n Counters – BCD Decade Counter.

Text Book:

Salivahanan, S., & Arivazhagan,S. (2012). *Digital Electronics*. Vikas Publishing.

Books for Reference:

Kumar, A. A. (2016). *Fundamentals of digital circuits*. PHI Learning Pvt. Ltd.
Malvino, A. P., & Leach, D. P. (1969). *Digital: Principles and Applications*. TMH (6th Edition).
Mano, M. M. (2002). *Digital design*. Pearson Educación (3rd Edition).
Sedha, R. S. (2008). *A Textbook of Digital Electronics*. S. Chand Publishing.

Outcomes	➢ Students will be able to perform how the conversion, arithmetic, and Logical operations on various number systems. ➢ Students will be able to minimize the digital circuits using Karnaugh map ➢ Students will be able to design various combinational logical circuits and where and how the mux, demux, encoder and decoders are used in digital circuit design ➢ Students will be able to design sequential logic circuits for memory design

Course Code	Allied Practical-IA	T/P	C	H/W
22BELAP1	**Computer Electronics – Digital Electronics Lab I A**	P	2	2

Objectives	➢ To understand the pin details of digital IC's and function of each logic gates with the help of the verification of truth table. ➢ To understand how the universal gates are used to design various logic gates ➢ To design combinational and sequential logical circuits using logical devices and various flip-flops respectively.

1. Logic Gates Using IC's and verify its truth table
2. Design Logic gates using Universal NAND gate and verify its truth table.
3. Design Logic gates using Universal NOR gate and verify its truth table.
4.. Design and Implementation of Code conversion using logic gates
5. Implementation of SOP and POS logical functions using universal gates.
6. Implementation of Half Adder and Full Adder using logic gates.
7. Implementation of Half Subtractor and Full Subtractor using Logic Gates
8. Implementation of Binary Adder and Subtractor using IC7483
9. Verification of Functionality of Multiplexer
10. Verification of Functionality of De multiplexer
11. Verification of functionality of Decoder.
12. Verification of functionality of Encoder.
13. Verification of the functionality of BCD to Seven segment decoder/driver.
14. Verification of functionality of Parity Generator and Checker
15. Implement S-R, D, J-K, T flip flops using logic Gates/IC's
16. Functional verification of universal shift registers using IC 7495.
17. Design and implementation of Ring counter using shift register.
18. Design and Implementation of 4 Bit Ripple counter
19. BCD Decade Counter
20. Mod Counter

Note: **Any Twelve Experiments**

Outcomes	➢ Students will be able to use digital IC's using their pin details and operating voltage ➢ Students will be able to use mux, demux, encoder and decoder where ever it is required in digital circuit design. ➢ Students will be able to design combinational logical circuits and sequential logical circuits

Course Code	Allied-IB	T/P	C	H/W
22BELA2	**Computer Electronics-I B**	T	3	3

Objectives	➢ To understand embedded system , embedded hardware and software ➢ To know the difference between microprocessor and microcontroller and its architecture ➢ To study the features, architecture, Programming model, how to develop an embedded coding using embedded C ➢ To acquire knowledge to programming I/O ports, Timers, Serial communication and interrupt ➢ To acquire skill to interface I/O devices with 8051 microcontroller
Unit - I	**Microcontroller architecture:** Introduction - Features of 8051 - Pin details of 8051 - 8051 Architecture - Oscillator and clocks - Program Counter - Stack and Stack Pointer - Data Pointer - A and B Registers - Bank Registers - Flags and PSW-Internal RAM - Special Function Registers.
Unit - II	**Embedded C**: Structure of Embedded C - Constants and Variables - Assignment Statements- conditional Statements - Looping Statements - User Defined functions.
Unit III	**Programming Parallel I/O Ports**: Port 0 - Port 1- Port2-Port 3 - I/O Port Programming - I/O bit Manipulation- Interrupts in 8051- Programming Timer 0 and Timer 1.
Unit IV	Serial communication Mode - Basic of serial communication - 8051 Connection to RS232 - 8051 serial Port Programming - Programming the serial communication interrupt.
Unit - V	LED Interfacing - Seven Segment Interfacing - LCD Interfacing - DIP interfacing - Hex Key Board Interfacing - Stepper Motor Interfacing - Traffic Light Interfacing - DC Motor Interfacing.

Text Books:

The 8051 Microcontroller Architecture, Programming and Applications, Kenneth J. Ayala – Penram International Publication, Second Edition -2004.

The 8051 Microcontroller and Embedded Systems using Assembly and C,Mohammed Ali Maszidi, Prentice Hall of India, Second Edition-2006. McGraw-Hill (2006)

Outcomes	➢ Students will be able to use 8051 for embedded system design ➢ Students will be able to develop coding skill using embedded C ➢ Students will be able to programming spf registers for parallel I/O, timers, serial communication sfr and interrupt spf registers ➢ Students will be able to design their embedded systems

Course Code 22BELAP2	Allied Practical– I B	T/P	C	H/W
	Computer Electronics –Embedded System Lab I B	P	2	2

Objectives	➢ To develop the skill to work on various IDE ➢ To develop code conversion, arithmetic operation and interfacing techniques ➢ To develop knowledge on embedded system design and interfacing techniques ➢ To develop the skill to develop coding for the embedded system

1. BCD to ASCII and ASCII to BCD.
2. Decimal to Hexa and Hexa to Decimal.
3. Addition and Subtraction
4. Multiplication and Division
5. Verify the Logical Operations
6. Interfacing 8 bit LED
7. Interfacing LCD
8. Interfacing with DIP switches and LED
9. Interfacing with Seven Segment LED
10. Interfacing with Traffic Light controller.
11. Interfacing with Stepper Motor
12. Interfacing with DC Motor speed control
13. Interfacing with HEX Keyboard
14. Interfacing Relay
15. Interfacing Buzzer

Outcomes	➢ Students will be able to handle various IDE for embedded programming ➢ Students will be able to design hardware and develop software ➢ Students will be able to operates their embedded system

Course Code	Allied - IIA	T/P	C	H/W
22BELA3	**Analog and Digital Communication Electronics**	T	3	3
Objectives	➢ Get knowledge to connect Op-Amp with power supply ➢ To understand how the Op-Amp is used for various applications ➢ To understand how the 555 timer operates in various modes ➢ To know how the Op-Amp perform filter operations ➢ To understand need of communication, types of communication, modulation, demodulation, transmitter, receiver and its medium ➢ To understand AM –FM-and optical communication system and its requirements ➢ To understand digital communication, shift keying and important terminologies			
Unit - I	**Operational Amplifiers:** IC 741 Op-Amp Terminals – Power Supply Connections – Negative Feed Back – Voltage Follower - Inverting Amplifier – Non inverting Amplifier – Inverting Summing Amplifier – Non inverting Summing Amplifier – Differential Amplifier – Integrator – Differentiator			
Unit - II	**Comparators and Waveform Generators:** Comparator – Schmitt trigger – Phase Shift Oscillator – Wien Bridge Oscillator – Square Wave Generator (Astable Multivibrator) –Monostable Multivibrator.			
Unit-III	**555-TIMER and PLL :** 555 Timer Pin Details – Description of Functional Block Diagram – Monostable Operation – Astable Operation – Pulse Position Modulator – Schmitt Trigger – Basic Principles of PLL			
Unit -IV	**Analog and Optical Communication:** Electronic Communication System-AM Modulation and Demodulation - FM Modulation and Demodulation - PAM - PWM - AM Transmitter and Receiver block diagram - Optical Communication system Block Diagram			
Unit -V	**Digital Communication**: Block diagram of digital transmission and reception-Information capacity, Bit Rate, Baud Rate and M-ary coding- Amplitude Shift Keying (ASK)- Frequency Shift Keying (FSK)-Phase Shift Keying (PSK)- Binary Phase Shift Keying (BPSK) - Quadrature Phase Shift Keying (QPSK)			
Text and Reference Books Coolen, J., & Roddy, D. (2021). *Electronic Communications Fourth Edition.* Roy Choudhury, D., & Shail B. Jain. (2010). *Linear Integrated Circuits*. New Age International Publishers, Fourth Edition.				
Outcomes	➢ Students will be able to develop their skill to handle Op-Amp for various applications and its circuit design. ➢ Students will be able to differentiate various communication and acquired knowledge on various modulation and demodulation techniques ➢ Students will able to understand the working function of transmitter and receiver using block diagrams			

Course Code 22BELAP3	Allied Practical - II A **Analog and Digital Communication Electronics Lab**	T/P P	C 2	H/W 2

Objectives	Any Twelve Experiments ➢ Get knowledge to connect Op-Amp with power supply ➢ To understand how the Op-Amp is used for various applications ➢ To understand how the 555 timer operates in various modes ➢ To understand AM/FM/PWM/Shift keying techniques and to measure the modulation index

1. Inverting and Inverting Summing Amplifier
2. Non Inverting and Non Inverting Summing Amplifier
3. Differential Amplifier
4. Differentiator and Integrator using OP-Amp
5. Schmitt trigger using Op-Amp
6. Square wave Generator using OP-Amp
7. Phase Shift / Wien bridge Oscillator using Op-Amp
8. Construct Astable Multivibrator using 555 Timer
9. Construct Monostable Multivibrator using 555 Timer
10. Amplitude Modulation and Demodulation
11. Frequency Modulation and Demodulation
12. Pulse Amplitude Modulation
13. Pulse Width Modulation
14. Amplitude Shift Keying
15. Frequency Shift Keying

Outcome	➢ Students will be able to develop their skill to handle Op-Amp for various applications and its circuit design. ➢ Students will able to see the modulation waves and demodulation waves using CRO

Course Code:	Allied – IIB	T/P	C	H/W
22BELA4	**Microprocessor Programming**	T	3	3

Objectives	➢ To learn logics and to develop assembly level language programming techniques to perform mathematical and logical operations. ➢ To learn and to develop interfacing and programming skills to interface incompatible I/O devices with 8085 and 8086 microprocessors.
Unit – I	**8085 Architecture** : Pin Description – 8085 Architecture – Bus Organization – De-multiplexing AD0-AD7 address and data bus – Generation of control signals. Memory Mapped I/O – I/O Mapped I/O
Unit – II	**8085 Programming** : Programming Model – Addressing Modes – Instruction Sets – Programming Techniques – Simple Programs.
Unit-III	**I/O Interfacing:** Basic interfacing Concept – Programmable I/O 8255 – Interfacing LED - interfacing Seven Segment Display - Interfacing LCD – Interfacing Stepper Motor.
Unit – IV	**8086 Architecture:** Pin Description for Minimum Mode – Pin description for Maximum Mode – Register Organization of 8086 – BIU – EU – External Memory Addressing – Minimum Mode Bus Cycle –Minimum Mode System Configuration.
Unit – V	**8086 Programming:** Addressing Modes –Instruction Set – Data Transfer Group – Control Transfer Group – Arithmetic Group – Logical Group – Miscellaneous Instruction Groups- Simple Programs.

Text Books:

Badri Ram. (2008). *Advanced Microprocessors and Interfacing*. Tata McGraw Hill (Unit IV and V)

Krishna Kant. (2013).*Microprocessors and Microcontrollers Architecture, Programming and System Design 8085,8086,8051,8096*. PHI learning Pvt.Ltd (Unit IV and V).

Ramesh S. Goanker. *Microprocessor Architecture, programming and Applications with the 8085*. Penram International Publishing, 5th Edition(Units I,II, and III)

Outcomes	➢ Student will be able to develop the skills to write an own assembly language programming ➢ Students will be able to understand the interfacing concept and develop the skill to interface the programmable interfacing peripherals and programming the various programmable devices to perform data transfer and control the I/O devices. ➢ Students will be able to develop the hardware and assembly Language Programming skill for 8085 and 8086 microprocessor system

Course Code: 22BELAP4	Allied Practical - II B	T/P	C	H/W
	Microprocessor and Interfacing Lab	P	2	2

	Any Twelve Experiments
Objectives	➢ To develop assembly level language programming techniques to perform mathematical and logical operations. ➢ To develop interfacing and programming skill to interface incompatible I/O devices with 8085 and 8086 microprocessors.

1. 8 bit and 16 bit addition using 8085/8086
2. 8bit and 16 bit subtraction using 8085/8086
3. 8bit Multiplication using 8085/8086
4. Logical Operations using 8085/8086
5. Block of Data Transfer using 8085/8086
6. Find the smallest / Biggest number in a given series
7. Arrange the given series in ascending order
8. Arrange the given series in descending order
9. 8 bit LED interfacing using 8085/8086
10. 8 bit DIP Interfacing using 8085/8086
11. Traffic Controller Interfacing using 8085/8086
12. Seven Segment Interfacing using 8085/8086
13. LCD interfacing using 8085/8086
14. Stepper Motor Interfacing using 8085/8086
15. DC Motor Interfacing using 8085/8086

Outcomes	➢ Student will be able to develop the skills to write an own assembly language programming ➢ Students will be able to understand the interfacing concept and develop the skill to interface the programmable interfacing peripherals and programming the various programmable devices to perform data transfer and control the I/O devices. ➢ Students will be able to develop the hardware and assembly Language Programming skill for 8085 and 8086 microprocessor system