SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
Sree Sainath Nagar, Tirupati
Department of Electronics and Communication Engineering

Supporting Document for 1.1.2

Syllabus Revision carried out in 2020

Program: B.Tech.- Electronics and Communication Engineering

Regulations: SVEC-20

This document details the following:

1. Courses where syllabus has been changed 20% and more.
2. Course-wise revised syllabus with changes highlighted.

Note: *For SVEC-20 revised syllabus, SVEC-19 (previous syllabus) is the reference.*

List of Courses where syllabus content has been changed
(20% and more)

S. No.	Course Code	Name of the course	Percentage of content changed	Page Number in which Details are Highlighted
1.	20BT40431	Analog Communications Lab	50	03
2.	20BT50431	Digital Communications Lab	50	07
3.	20BT40432	Digital Design Lab	100	11
4.	20BT40405	Microcontroller and Interfacing	100	13
5.	20BT50405	VLSI System Design	100	15
6.	20BT60411	PIC Microcontrollers	100	17
7.	20BT70433	Programming using LabVIEW	100	19
8.	20BT704AC	Internet of Things Applications	100	21
9.	20BT20541	Programming in C and Data Structures	100	23
10.	20BT20551	Programming in C and Data Structures Lab	100	25
11.	20BT40501	Database Management Systems	100	28
		Average %(A)	90.9	-
		Total No. of Courses in the Program(T)	119	
		No. of Courses where syllabus (more than 20%) has been changed(N)	11	
		Percentage of Syllabus content change in the courses **(C)=(AXN)/100**	9.99	
		Percentage of Syllabus content changed in the Program(P) =(C/T)X100	8.4	

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SREE VIDYANIKETHAN ENGINEERING COLLEGE
Sree Sainath Nagar, A. RANGAMPET
CHITTOOR (DT.)-517 102, A.P.

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SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
Sree Sainath Nagar, A. RANGAMPET
Chittoor (Dist.) - 517 102, A.P., INDIA.

II B. Tech. – II Semester
(20BT40431) ANALOG COMMUNICATIONS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -

COURSE DESCRIPTION: Simulation and study of various modulation schemes: AM, DSB-SC, SSB, FM, PAM, PWM, analysis of analog transmitter and receiver.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Analyze measure and validate the practical observations by applying the conceptual knowledge of various Analog modulations.
CO2. Analyze measure and validate the practical observations by applying the conceptual knowledge of various Pulse-Analog modulations.
CO3. Analyze the characteristics of analog transmitter and receiver circuits.
CO4. Simulate various Analog and Pulse-Analog modulations Using MATLAB tool.

List of Exercises/List of Experiments:

1 Amplitude modulation and demodulation (AM, DSB-SC, SSB)

2 Frequency modulation and Demodulation.

3 Spectral analysis of AM signals using spectrum analyzer.

4 Pre-emphasis & De-emphasis

5 Radio receiver measurements.

6 Characteristics of mixer.

7 Pulse-Analog Modulations-Demodulations (PAM,PWM,PPM).

8 Simulation of AM,DSB-SC,SSB using MATLAB

9 Simulation of Frequency modulation and Demodulation using MATLAB

10 Simulation of Pulse-Analog Modulations-Demodulations (PAM,PWM,PPM) using MATLAB

REFERENCE BOOKS/LABORATORY MANUALS:

1. *Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010.*

2. *R.P. Singh, SP Sapre, Communication Systems, TMH, 2nd Edition, 2007.*

3.*Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.*

4. *B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.*

SOFTWARE/Tools used:

- MATLAB

III B. Tech. – I Semester
(19BT50431) **ANALOG AND DIGITAL COMMUNICATIONS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Courses on Signals and systems & Analog Communications.

COURSE DESCRIPTION: Simulation and verification of various analog and digital modulation schemes.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1. Analyze, measure and validate the practical observations by applying the conceptual knowledge of various Analog modulations.
CO2. Analyze, measure and validate the practical observations by applying the conceptual Knowledge of various Digital modulation schemes &Techniques.
CO3. Simulate various Analog and Digital modulations Using MATLAB tool.
CO4. Work independently or in teams to solve problems with effective communication.

List of Exercises/List of Experiments:

(Minimum **Ten** Experiments are to be conducted):

1. Amplitude modulation and demodulation(AM, DSB-SC,SSB)
2. Frequency modulation and demodulation.
3. Pulse Analog Modulation & Demodulation (PAM,PWM,PPM)
4. Verification of Sampling Theorem
5. Study the Pulse code modulation system.
6. Study the Delta Modulation system.
7. Perform Digital carrier modulations (ASK, PSK, FSK, DPSK)
8. Spectral analysis of AM signals using spectrum analyzer.
9. Generate the AM and FM signals using MATLAB
10. Generate the PSK & FSK modulation and demodulation signals using MATLAB
11. Generate the QPSK & DPSK modulation and demodulation signals using MATLAB
12. Generate the PCM and DM modulation and demodulation signals using MATLAB
13. Design of Matched filter and constellation diagrams using MATLAB.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Herbert Taub. Donald L Schiling, Goutam Sana, *Principles of Communication Systems*, McGraw-Hill, 4th Edition, 2012.
1. B.P.Lathi, Zhi Ding *Modern Digital and Analog Communication Systems*, Oxford, 4th Edition, 2012.
1. Simon Haykin, *Digital Communications Systems*, Wiley, 2013.
2. K. Sam Shanmugam, *Digital and Analog Communication Systems*, Wiley, 2019.
3. R.P Singh and S.D Sapre, *Communication Systems Analog and Digital*, *McGraw Hill Education*, 3rd Edition, 2017.

SOFTWARE/Tools used: MATLAB

Major Equipments required for Laboratories:

1. CROs: 20MHz
2. Function Generators: 2MHz
3. Spectrum Analyzer
4. Regulated Power Supplies: 0-30V
5. MAT Lab/Equivalent Simulation Package with Communication tool box
6. Analog and Digital Modulation and Demodulation Trainer Kits.

III B. Tech. –I Semester
(20BT50431) DIGITAL COMMUNICATIONS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: Courses on Signals and systems & Analog Communications.

COURSE DESCRIPTION: Simulation and verification of various digital modulation schemes and techniques.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1. Analyze and measure the practical observations by applying the conceptual Knowledge of various Digital Modulation schemes.

CO2. Analyze and measure the practical observations by applying the conceptual Knowledge of various Digital Modulation Techniques.

CO3. Simulate various Digital Modulations Schemes & Techniques Using MATLAB tool.

CO4. Work independently or in teams to solve problems with effective communication.

List of Exercises/List of Experiments:

1. Verification of Sampling Theorem.
2. Pulse code modulation and demodulation.
3. Delta modulation and demodulation.
4. Perform ASK, FSK & PSK Modulation and demodulations.
5. Perform DPSK Modulation and demodulation.
6. Perform QPSK Modulation and demodulation.
7. Generation and Detection PCM signals using MATLAB.
8. Generation and Detection of DM signals using MATLAB.
9. Generation and Detection of PSK & FSK signals using MATLAB.
10. Generation and Detection of QPSK signal using MATLAB.
11. Generation of TDM signal using MATLAB.

REFERENCE BOOKS/LABORATORY MANUALS:

1. *Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010.*
2. *R.P. Singh, SP Sapre, Communication Systems, TMH, 2nd Edition, 2007.*
3. *Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.*

4. *B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.*

5. *K. Sam Shanmugam, Analog and Digital Communication, Willey,2005.*

SOFTWARE/Tools used: MATLAB

Major Equipments required for Laboratories:

1. CROs: 20MHz
2. Function Generators: 2MHz
3. Spectrum Analyzer
4. Regulated Power Supplies: 0-30V
5. MAT Lab/Equivalent Simulation Package with Communication tool box
6. Digital Modulation and Demodulation Trainer Kits.

III B. Tech. –I Semester
(19BT50431) **ANALOG AND DIGITAL COMMUNICATIONS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Courses on Signals and systems & Analog Communications.

COURSE DESCRIPTION: Simulation and verification of various analog and digital modulation schemes.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1. Analyze, measure and validate the practical observations by applying the conceptual knowledge of various Analog modulations.
CO2. Analyze, measure and validate the practical observations by applying the conceptual Knowledge of various Digital modulation schemes &Techniques.
CO3. Simulate various Analog and Digital modulations Using MATLAB tool.
CO4. Work independently or in teams to solve problems with effective communication.

List of Exercises/List of Experiments:

(Minimum **Ten** Experiments are to be conducted):

1. Amplitude modulation and demodulation(AM, DSB-SC,SSB)
2. Frequency modulation and demodulation.
3. Pulse Analog Modulation & Demodulation (PAM,PWM,PPM)
4. Verification of Sampling Theorem
5. Study the Pulse code modulation system.
6. Study the Delta Modulation system.
7. Perform Digital carrier modulations (ASK, PSK, FSK, DPSK)
8. Spectral analysis of AM signals using spectrum analyzer.
9. Generate the AM and FM signals using MATLAB
10. Generate the PSK & FSK modulation and demodulation signals using MATLAB
11. Generate the QPSK & DPSK modulation and demodulation signals using MATLAB
12. Generate the PCM and DM modulation and demodulation signals using MATLAB
13. Design of Matched filter and constellation diagrams using MATLAB.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Herbert Taub. Donald L Schiling, Goutam Sana, *Principles of Communication Systems*, McGraw-Hill, 4th Edition, 2012.
2. B.P.Lathi, Zhi Ding *Modern Digital and Analog Communication Systems*, Oxford, 4th Edition, 2012.
4. Simon Haykin, *Digital Communications Systems*, Wiley, 2013.
5. K. Sam Shanmugam, *Digital and Analog Communication Systems*, Wiley, 2019.
6. R.P Singh and S.D Sapre, *Communication Systems Analog and Digital*, *McGraw Hill Education*, 3rd Edition, 2017.

SOFTWARE/Tools used: MATLAB

Major Equipments required for Laboratories:

1. CROs: 20MHz
2. Function Generators: 2MHz
3. Spectrum Analyzer
4. Regulated Power Supplies: 0-30V
5. MAT Lab/Equivalent Simulation Package with Communication tool box
6. Analog and Digital Modulation and Demodulation Trainer Kits.

II B. Tech. – II Semester

(20BT40432) DIGITAL DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: Courses on Switching Theory and Logic Design & Electronic Devices and Circuits.

COURSE DESCRIPTION: Design and verification of Digital Circuits, PCB Design of Electronic Circuits.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Design and Realize various Digital applications by using ICs for societal needs.

CO2: Implement Electronic Circuits using Passive and Active elements for specified applications.

CO3: Analyze performance parameters for PCB designed circuits using a simulation tool.

CO4: Work independently and in teams to solve problems with effective Communication.

List of Exercises/List of Experiments:

Part-A: Realize the Following in Hardware

(Minimum **Six** Experiments are to be conducted)

1. Realize gates using NAND & NOR gates.
2. Optimize and Realize a given Boolean Function.
3. Design and Realize BCD to Excess-3 Code Converter.
4. Design and Realize Adder and Subtractor using Multiplexer based on logic gates/ IC74153.
5. Design and Realize a BCD to 7-Segment Decoder using Logic Gates/ ICs.
6. Design and Realize a Hexadecimal to Binary Encoder using IC74148 and IC74157.
7. Design and Realize a Sequence Generator using IC7495.
8. Design and Realize Asynchronous and Synchronous counters using IC7476 (JK-Flip Flop).

Part-B: PCB Layout Design of Electronic Circuits using TINAPRO/ eSIM-KiCAD/ TinyCAD/ Fritzing Software

(Minimum **Four** Experiments are to be conducted)

1. RC Filter.
2. Half Wave Precision Rectifier.
3. Zener Regulator.
4. Diode Clamper.
5. Transistor as a Switch.
6. CMOS Inverter.

REFERENCE BOOKS/LABORATORY MANUALS:

1. John F. Wakerly, *Digital Design Principles & Practices*, Pearson Education Asia, 4th Edition, 2008.

SOFTWARE/Tools used:

TINAPRO/ eSIM-KiCAD/ TinyCAD PCB Design Tool.

ADDITIONAL LEARNING RESOURCES:

1. http://vlabs.iitb.ac.in/vlabsdev/vlab_bootcamp/bootcamp/cool_developers/index.html - Virtual labs for digital circuits
2. https://nptel.ac.in/courses/108/108/108108031/
3. https://swayam.gov.in/nd2_aic20_sp59/preview

II B. Tech. - II semester

(20BT40405) MICROCONTROLLER AND INTERFACING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	2	-	-	2

PREREQUISITES: A **c**ourse on Switching Theory and Logic Design

COURSE DESCRIPTION: 8051 Microcontroller - Architecture, programming, interrupts and applications;

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Analyze various components of a computer system and criterion for choosing a microcontroller for realizing a prototype.
CO2: Analyze Architectural features and Instruction Set of 8051 for control applications.(2,3)
CO3: Develop Programs at Assembly level using various on Chip resources for realizing Medium Scale Applications.
CO4: Design microcomputer based systems with the knowledge of Interfaces and Peripherals with 8051 to solve various engineering problems

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO MICROCONTROLLERS **(06 Periods)**

Major components of a computer system, Role of CPU, Major Components & Purpose, Microprocessors Vs Microcontrollers, Concept of Embedded Systems, Criterion for considering a Microcontroller.

UNIT-II: ARCHITECTURE OF 8051 **(06 Periods)**

Compare various members of 8051 Family, 8051 Architecture, Register Organization – General & Special purpose, Pin out details, Extended mode (External Memory Interfacing), Timing details

UNIT-III: PROGRAMMING 8051 AT ASSEMBLY LEVEL **(06 Periods)**

Addressing Modes, Instruction Set, Sample Programs

UNIT-IV: PROGRAMMING ON-CHIP RESOURCES AT ASSEMBLY LEVEL **(06 Periods)**

Timer/ counter, Serial Port, Interrupts

UNIT-V: 8051 INTERFACING **(06 Periods)**

8255 Introduction, LED, 7 –Segment display, LCD, Keyboard, ADC, DAC, Sensor

Interfacing, Relay, DC Motor, Stepper Motor

Total Periods: 30

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay, *The 8051 Microcontroller and Embedded Systems-using assembly and C,* PHI, 2006/ Pearson 2008

REFERENCE BOOKS:

1. Ayala, *8051 Microcontroller, Cengage Learning, 3rd Edition, Nov. 2007*
2. Kenneth J. Ayala, *The 8051 Microcontroller-Architecture, Programming & Applications,* 3rd Edition, Cengage learning, June 2004.

III B. Tech. – I Semester
(20BT50405) VLSI SYSTEM DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	2	-	-	2

PRE-REQUISITES: A Course on Switching Theory and Logic Design.

COURSE DESCRIPTION: Logic Families; CMOS Technology; Stick Diagrams and Layouts; Subsystem design; Implementation of VLSI systems,FPGA;

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Analyze logic families, steady state and dynamic characteristics of CMOS, to improve performance characteristics of digital ICs.

CO2: Analyze electrical properties of MOS circuits for VLSI/ULSI chip fabrication.

CO3: Develop stick diagrams and layouts of CMOS circuits by analyzing the basic circuit concepts like sheet resistance, capacitance.

CO4: Design subsystems for High-speed digital electronics to compensate tradeoff among area, speed and power requirements.

CO5: Select appropriate reconfigurable platforms like FPGA and CPLD for the implementation of VLSI system.

DETAILED SYLLABUS:

UNIT I - DIGITAL LOGIC FAMILIES **(5 Periods)**
Introduction to logic families, RTL, DTL, Transistor-Transistor logic, CMOS logic, CMOS steady state and dynamic electrical behavior.

UNIT II - FABRICATION AND ELECTRICAL PROPERTIES OF MOS **(6 Periods)**
Fabrication Process for NMOS and CMOS technology, Basic Electrical Properties of MOS: I_{ds} – V_{ds} relationship, Threshold Voltage V_T, g_m, g_{ds} and ω_0; Pass Transistor, NMOS inverter, CMOS Inverter.

UNIT III - CMOS CIRCUIT DESIGN PROCESS **(7 Periods)**
MOS layers, stick diagrams, NMOS design style, CMOS design style, lambda-based design rules, layouts for inverters, sheet resistance, capacitances of layers, Gate delays.

UNIT IV - SUBSYSTEM DESIGN **(06 Periods)**
Adders –Transmission based Adder, Carry look-ahead adder, Carry Skip Adder, Carry Select Adder; Barrel Shifter, Array Multiplier, Counters- Synchronous & Asynchronous Counter.

UNIT V –PROGRAMMABLE HARDWARE **(06 Periods)**
VLSI Design Flow, CAD Tools for Design and Simulation, Design styles, FPGAs,

Programmable Interconnect structures, CPLDs, Cell based Design Methodology.

Total Periods: 30

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Kamran Eshraghian, Douglas A. Pucknell and sholeh Eshraghian, *Essentials of VLSI Circuits and Systems*, PHI, 2005.
2. Morris Mano, *Digital Design*, Prentice Hall, 3rd Edition, 2003 .

REFERENCE BOOKS:

1. John F.Wakerly, *Digital Design Principles & Practices*, Pearson Education Asia, 4th Edition, 2008.
2. John M. Rabaey, *Digital Integrated Circuits: A Design Perspective*, PHI, 2nd Edition, 2003.

III B.Tech. - II semester
(20BT60411) PIC MICROCONTROLLERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	2	-	-	2

PREREQUISITES: Courses on Switching Theory and Logic Design , Linear and Digital IC Applications & Microcontrollers and Interfacing.

COURSE DESCRIPTION: PIC microcontroller architecture, Interrupts and timers of PIC microcontroller, interfacing

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1 Analyze Architectural features of PIC family of Microcontrollers for control applications.
CO2 Analyze PIC18 Architecture and Instruction Set to develop computing applications.
CO3 Develop Programs for PIC18 using ports, timers and associated on Chip resources for Specified Applications.
CO4 Design microcomputer based systems with the knowledge of Interfaces and Peripherals of PIC18 to Solve various engineering problems.

DETAILED SYLLABUS:

UNIT I: PIC ARCHITECTURE **(05 Periods)**
Architecture of PIC18, Register Organization, Memory Organization - ROM space & RAM.

UNIT II: PIC PROGRAMMING **(05 Periods)**
Data formats & Directives, Instruction Set: Arithmetic, Logic, branching, Bit wise, bank switching, Simple PIC Programs.

UNIT- III: PORTS, TIMERS & PROGRAMMING **(07 Periods)**
Pin description of PIC18F452, Basic Port Structure, I/O port programming; Macros and modules, Structure of Timer 0 & its Programming using Assembly and C, Counter programming, Structure of timers 1, 2 and 3 & their Programming.

UNIT- IV: PIC - SERIAL PORT AND INTERRUPTS **(06 Periods)**
Basics of communication – Serial/Parallel, RS232 & PIC18 connection to RS232, Serial Port Structure & programming; PIC18 interrupts, Programming timer interrupts, Programming serial interrupts.

UNIT- V: PIC INTERFACING **(07 Periods)**
7 segment LED and LCD interfacing, keyboard interfacing, interfacing ADC, DAC, Interfacing DC motor, stepper motor, PWM using CCP.

Total Periods: 30

Topics for self-study are provided in the lesson plan

TEXT BOOK:

1. Muhammad Ali Mazidi, Rolin D. McKinlay, Danny causey, *PIC Microcontroller and Embedded Systems: Using C and PIC18*, Pearson Education, 2015.

REFERENCE BOOKS:

1. Ramesh S. Gaonkar, *Fundamentals of Microcontrollers and Applications in Embedded Systems (With PIC18 Microcontroller Family),* Penram International, 2010.

ADDITIONAL LEARNING RESOURCES:

1. http://crystal.uta.edu/~zaruba/CSE3442/
2. https://owd.tcnj.edu/~hernande/ELC343/
3. http://www.ciebookstore.com/Content/Images/uploaded/PIC18-Study-Guide-CIE.pdf

IV B. Tech.– I Semester

(20BT70433)**PROGRAMMING USING LabVIEW**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	2	2

PRE-REQUISITES: Courses on Analog communications, Switching Theory and Logic Design & Digital signal Processing.

COURSE DESCRIPTION: Basics of LabVIEW; Implementation of Digital Circuits, filters in signal processing; interfacing and controlling of external devices.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate components, tools in LabVIEW.

CO2. Develop combinational and sequential circuits.

CO3. Implement modulation and demodulation schemes, low pass and high pass filters.

CO4. Implementation of Fourier transform, FIR, IIR filters and simulate spectrum analyzer.

CO5. Interface and control external devices to solve real time problems.

CO6. Work independently and in teams to solve problems with effective communication.

LIST OF EXPERIMENTS:

1. Familiarization of components, tools in LabVIEW.
2. Loops, Structures and Math-script in LabVIEW
3. Conversion of number systems
4. Implementation of half adder and full adder
5. Implementation of RS, T and D flip-flops
6. Simulation of AM, FM, DSB-SC modulation and demodulation schemes
7. Design of low pass and high pass filters
8. simulation of spectrum analyzer
9. Implementation of FIR and IIR filters
11. controlling of DC and Stepper motor
12. sensor data acquisition using Arduino
13. Interfacing of myRIO
14. Speed and level measurement using LabVIEW and myRIO.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Travis Jeffrey, Jim Kring, *LabVIEW for Everyone*, Pearson Education, 2009.

2. Johnson Jennings, *LabVIEW Graphical Programming*, McGraw Hill, 4th Edition, 2014.
3. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International Pvt. Ltd., 4th Edition, 2010.
4. D. Patranabis, *Principles of Industrial Instrumentation*, TMH, 3rd Edition, 2010.
5. Ramon PallásAreny, John G. Webster, *Sensors and Signal Conditioning*, John Wiley and Sons, 2nd Edition, 2000.
6. A. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, 19th edition, 2011.

SOFTWARE/Tools used:

1. NI Labview 2018
2. NI myRIO
3. Arduino UNO R3

ADDITIONAL LEARNING RESOURCES:

1. https://www.ni.com/pdf/manuals/320999e.pdf
2. https://ieeexplore.ieee.org/document/8960023/
   A Different way of Level measurement for PBL in Education of Students using NI-LabVIEW, Multisim and MyRIO
3. http://www.ni.com/pdf/manuals/376047c.pdf
4. https://www.clemson.edu/cecas/departments/ece/document_resource/undergrad/lab_manuals/NI_ELIVS_II_Orientation_Manual.pdf
5. http://www.ni.com/pdf/manuals/374629c.pdf
6. http://www.ni.com/pdf/manuals/373363f.pdf

IV B.Tech. - I semester
(20BT704AC) INTERNET OF THINGS APPLICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES:--

COURSE DESCRIPTION: Basics of IoT; Sensors; IoT Design Methodology; Basics of Arduino and Raspberry Pi; IoT Application Development using Raspberry Pi and Arduino; Data Acquisition with Python and Tkinter; Connecting to the Cloud; Blynk Application with Raspberry Pi.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on Principles of IoT and Sensors.
CO2. Design basic IoT Applications using Arduino.
CO3. Design IoT Applications using Raspberry Pi.
CO4. Perform Data Acquisition and analysis using Cloud and Tkinter.
CO5. Develop Real-time applications using Blynk with Raspberry Pi

DETAILED SYLLABUS:

UNIT-I: **(05 Periods)**
Introduction to Internet of Things: Characteristics of IoT, Design principles of IoT, IoT Architecture and Protocols, Enabling Technologies for IoT, IoT levels and IoT vs M2M.
Sensors: Classification of Sensors, Working Principle of Sensors, Criteria to choose a Sensor, Generation of Sensors.

UNIT-II: **(05 Periods)**
IoT Design Methodology: Design methodology, Challenges in IoT Design, IoT System Management, IoT Servers..
Basics of Arduino: Introduction to Arduino, Arduino IDE, Basic Commands for Arduino, Connecting LEDs with Arduino, Connecting LCD with Arduino.

UNIT-III: **(08 Periods)**
Basics of Raspberry Pi: Introduction to Raspberry pi, Installation of NOOBS on SD Card, Installation of Raspbian on SD Card, Terminal Commands, Installation of Libraries on Raspberry Pi, Getting the static IP address of Raspberry Pi, Run a Program on Raspberry Pi, Installing the Remote Desktop Server, Pi Camera, Face Recognition using Raspberry Pi, Installation of I2C driver on Raspberry Pi, SPI (serial peripheral interface) with Raspberry Pi, Programming a Raspberry Pi, Play with LED and Raspberry Pi, Reading the digital input, Reading an edge triggered input, Interfacing of Relay with Raspberry Pi, Interfacing of Relay with Raspberry Pi, Interfacing of LCD with Raspberry Pi, Interfacing LCD with Raspberry Pi in I2C mode, Interfacing of DHT11 sensor with Raspberry Pi, Interfacing of ultrasonic sensor with Raspberry Pi, Interfacing of camera with Raspberry pi.

UNIT-IV: **(07 Periods)**
Data Acquisition with Python and Tkinter: Basics-CSV file, Storing Arduino data with CSV file, Plotting random numbers using matplotlib, Plotting real-time from Arduino, Integrating the plots in the Tkinter window.

Connecting to the Cloud: Smart IoT Systems, DHT11 Data Logger with ThingSpeak Server, Ultrasonic Sensor Data Logger with ThingSpeak Server, Air Quality Monitoring System and Data Logger with ThingSpeak Server, Landslide Detection and Disaster Management System, Smart Motion Detector and Upload Image to gmail.com.

UNIT-V: **(05 Periods)**

Blynk Application with Raspberry Pi: Introduction to Blynk, Creating new project with Blynk, Home Appliance Control with Blynk App, Cayenne Application with Raspberry Pi, Introduction to Cayenne, LED blink with Cayenne App.

Total Periods: 30

Topics for Self-study are provided in the Lesson Plan

TEXT BOOK:

1. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh**,** Mahendra Swain, *Internet of Things with Raspberry Pi and Arduino,* CRC Press, 2019.

REFERENCE BOOKS:

1. Jan Holler and Vlasios Tsiatsis, *From Machine-to-Machine to the Internet of Things Introduction to a New Age of Intelligence,* Elsevier Ltd., 2014.
2. 2. David Hanes and Gonzalo Salgueiro, *IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things,* Cisco Press, 2017

I B. Tech. – II Semester

(20BT20541) PROGRAMMING IN C AND DATA STRUCTURES

(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: ACourse on Basic Mathematics

COURSE DESCRIPTION: Algorithms; Flowcharts;Introduction to C language; Operators and expressions; Input and output functions; Control statements; Arrays; Strings; Functions; Pointers; User-defined data types;Linked lists; Overview of data structures; Stack; Queue; Searching algorithms; Sorting algorithms.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Develop flowcharts, algorithms for given problems.
CO2. Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
CO3. Apply linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO4. Select appropriate techniques for searching and sorting problems.

DETAILED SYLLABUS:

UNIT-I: Introduction to C Programming **(08 Periods)**

Introduction to Algorithms and Flowcharts: What is an algorithm, Different ways of stating algorithms, Key features of algorithm, What are variables, Subroutines,Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Basis of C Programming: Introduction, Structure of a C program, Concept of a variable, Data types in C, Program statement, Declaration, Howdoes the computer store data in memory, Tokens, Operators and expressions, Expressions revisited, Type conversion in C.

UNIT-II: Input and Output, Control Statements **(09 Periods)**

Input and Output: Basic screen and keyboard I/O in C, Non-formatted input and output, Formatted input and output functions.

Control Statements: Specifying test condition for selection and iteration, Writing test expression, Conditional execution and selection, Iteration and repetitive execution, goto statement, Special control statements, Nested loops.

UNIT-III: Arrays and Strings, Functions **(10 Periods)**

Arrays and Strings: One-dimensional array – Declaration, Initialization,Manipulation;Multi-dimensional arrays – Declaration, Initialization, Manipulation; Strings – Declaration, Initialization, String input/output, Character manipulation, String manipulation; Arrays of strings – Declaration, Initialization, Manipulation.

Functions: Concept of function, Using functions, Call by value mechanism, Working with functions, Passing arrays to functions, Scope and extent, Storage classes, Recursion.

UNIT-IV: Pointers, User-Defined Data Types, Linked Lists **(10 Periods)**

Pointers in C: Understanding memory addresses, Address operator (&), Pointer, Arrays and pointers, Pointers and strings, Pointer arithmetic, Pointers to pointers, Array of pointers, Pointers to an array, Two-dimensional arrays and pointers, Dynamic memory allocation.

User-Defined Data Types: Structures - Declaration, Initialization, Accessing members,Arrays of structures, Arrays within structure, Structures and pointers, Structures and functions; Enumeration types.

Linked Lists: Single linked lists – Definition, Representation, Operations, Inserting a node, Deleting a node; Applications of linked lists, Disadvantages of linked lists, Array versus linked list revisited.

UNIT-V: Data Structures **(08 Periods)**

Basic Data Structures: Overview of data structures, Stack – Definition, Array representation, Implementation of stack operations using arrays; Queue - Definition, Array representation, Implementation of queue operations using array.

Searching and Sorting: Linear Search, Binary Search, Bubble sort, Selection sort.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Pradip Dey and Manas Ghosh, *Programming in C,*Oxford University Press, 2018.
2. DebasisSamanta, *Classic Data Structures,*2nd Edition, PHI Learning, 2009.

REFERENCE BOOKS:

1. Byron S Gottfried and Jitender Kumar Chhabra, *Programming with C*, 4thEdition, McGraw Hill Education, 2019.
2. YashavantKanetkar, *Let Us C,* 17thEdition, BPB Publications, 2020.

ADDITIONAL LEARNING RESOURCES:

- E. Balagurusamy, *Programming in C*, 7thEdition, McGraw Hill, 2014.
- R. G. Dromey, *How to Solve it by Computer*, Pearson Education, 2007.
- https://nptel.ac.in/courses/106/104/106104128/
- https://nptel.ac.in/courses/106/103/106103069/

I B. Tech. – II Semester

(20BT20551) PROGRAMMING IN C AND DATA STRUCTURES LAB

(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on "Programming in C and Data Structures"

COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs – Control statements, Arrays, Strings, Functions, Pointers, Structures, Single linked lists,Stack, Queue, Searching and Sorting.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
CO2. Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO3. Select appropriate techniques for searching and sorting problems.
CO4. Work independently and communicate effectively in oral and written forms.

LIST OF EXERCISES:

. a) Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.

i) i) a + b ii) a–b iii) a * b iv) a/b v) a % b

b) b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.

i) $(ax + b)/(ax - b)$
ii) $2.5 \log x + \text{Cos } 32^0 + | x^2 + y^2 |$
iii) $x^5 + 10\, x^4 + 8$ and $x^3 + 4x + 2$
iv) ae^{kt}

. a) Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = PTR / 100)

b) A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.

c) In a town, the percentage of men is 52. The percentage of total literacy is 48. If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.

. a) 2. Write a program that prints the given three integers in ascending order using if - else.

b) i) Write a program to calculate commission for the input value of sales amount.

Commission is calculated as per the following rules:

i) Commission is NIL for sales amount Rs. 5000.

ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.

iii) Commission is 5% for sales amount >Rs. 10000.

c) ii) If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.

. a) An insurance company calculates premium as follows:

i) If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.

ii) If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.

iii) If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.

iv) In all other cases the person is not insured.

Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

b) Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, %. Use switch statement)

. a) Write a program to find the sum of individual digits of a positive integer.

b) A Fibonacci sequence is defined as follows: The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.

. a) Write a program to find the largest and smallest number in a given list of integers.

b) Write a program to perform addition of two matrices.

c) Write a program to determine whether the given string is palindrome or not.

. a) Write a program using functions to perform the following operations:

i) To convert a given decimal number into binary number

ii) To convert a given binary number into decimal number

b) Write a program using functions insert a sub-string in main string at a specified position.

. a) Write a C program to print the elements of an array in reverse order using pointers.

b) Write a program to accept the elements of the structure as: Employee-name, Basic pay. Display the same structure along with the DA, CCA and Gross salary for 5 employees.
Note: DA=51% of Basic pay, CCA=Rs.100consolidated.

. A college has N number of students and the following details of all the students are maintained – register number, name, branch, phone number. Write a program to store the details of the students using a singly linked list. Develop functions to perform the following operations on the data.

i) Insert new student's details
ii) Display the details of the students
iii) Delete a given student's information

0. a) Develop a menu driven program to perform the following operations on a stack of integers (Array implementation of stack with maximum size MAX)

i) Push an element
ii) Pop an element
iii) Display the status
iv) Demonstrate overflow and underflow situations

b) Develop a menu driven program to perform the following operations on a queue of characters (Array implementation of queue with maximum size MAX).

i) Insert an element
ii) Delete an element
iii) Display the status
iv) Demonstrate overflow and underflow situations

1. Store register numbers of students who attended placement training program in a random order in an array. Write a function to search whether a student has attended placement training program or not using

a) Linear Search
b) Binary Search

2. Given marks of N number of students in mathematics subject, write a program to display the marks of students in ascending order using

a) Bubble Sort
b) Selection Sort

TEXT BOOKS:

1. Pradip Dey and Manas Ghosh, *Programming in C,* Oxford University Press, 2018.
2. DebasisSamanta, *Classic Data Structures,* 2nd Edition, PHI Learning, 2009.

REFERENCE BOOKS:

1. Byron S Gottfried and Jitender Kumar Chhabra, *Programming with C*, 4th Edition, McGraw Hill Education, 2019.
2. YashavantKanetkar, *Let Us C,* 17thEdition, BPB Publications, 2020.

III B. Tech. – II Semester

(20BT40501) DATABASE MANAGEMENT SYSTEMS

(Inter Disciplinary Elective- 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to database systems; Database design; Relational model; Relational algebra; SQL queries; Constraints and triggers; PL/SQL; Schema refinement and normal forms; Transaction management; Concurrency control; Overview of storage and indexing.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1. Apply the concepts of ER-modeling and normalization to design viable data models for a given problem.

CO2. Formulate relational database schemas, apply suitable integrity constraints, for querying databases.

CO3. Use SQL to store, query, and manipulate data in relational databases.

CO4. Develop PL/SQL blocks to centralize database applications for maintainability and reusability.

CO5. Analyze transaction processing, concurrency control and storage methods for database management.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO DATABASE SYSTEMS AND DATABASE DESIGN **(8 Periods)**

Introduction to Database Systems: Database system applications, Purpose of database systems, View of data - Data abstraction, Instances and schemas, Data models; Database languages - Data Definition Language, Data Manipulation Language; Database architecture, Database users and administrators.

Introduction to Database design: Database design and ER diagrams, Entities, attributes and entity sets, Relationships and relationship sets, Additional features of ER model, Conceptual Design with ER model.

UNIT- II: RELATIONAL MODEL AND RELATIONAL ALGEBRA **(8 Periods)**

Relational Model: Creating and modifying relations, Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design, Introduction to views, Destroying/altering tables and views.

Relational Algebra: Preliminaries, Relational Algebra operators.

UNIT- III: SQL AND PL/SQL **(10 Periods)**

SQL: Form of basic SQL query, Nested queries, Aggregate operators, Null values, Complex integrity constraints in SQL, Triggers and active databases.

PL/SQL: Generic PL/SQL block, PL/SQL data types, Control structure, Procedures and functions, Cursors, Database triggers.

UNIT- IV: SCHEMA REFINEMENT AND TRANSACTIONS **(10 Periods)**

Schema Refinement: Problems caused by redundancy, Decompositions, Problems related to decomposition, Functional dependencies, Reasoning about FDs, First normal form, Second normal form, Third normal form, Boyce-Codd normal form, Multivalued dependencies, Fourth normal form, Join dependencies, Fifth normal form.

Transactions: Transaction concept, Transaction atomicity and durability, Concurrent Executions – Serializability, Recoverability, Implementation of isolation, Testing for serializability.

UNIT- V: CONCURRENCY CONTROL, STORAGE AND INDEXING **(9 Periods)**

Concurrency Control: Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Deadlock Handling.

Storage and Indexing: Data on external storage, File organizations and indexing – Clustered indexes, Primary and secondary indexes; Index data structures – Hash based indexing, Tree based indexing; Comparison of file organizations.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Raghu Ramakrishnan, Johannes Gehrke, *Database Management Systems*, McGraw Hill, 3rd Edition, 2014.
2. Abraham Silberschatz, Henry. F. Korth, S. Sudarshan, *Database System Concepts*, McGraw Hill, 7th edition, 2019.

REFERENCE BOOKS:

1. Ivan Bayross, *SQL, PL/SQL: The Programming Language of Oracle*, BPB publications, 4th Edition, 2017.
2. RamezElmasri, Shamkant B. Navathe, *Fundamentals of Database Systems*, 7th Edition, Pearson, 2015.

ADDITIONAL LEARNING RESOURCES:

- https://swayam.gov.in/nd1_noc19_cs46/preview
- https://www.classcentral.com/course/swayam-introduction-to-database-systems-17660