SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, Tirupati

Department of Electronics and Instrumentation Engineering

Supporting Document for 1.1.2

Syllabus revision carried out in 2020

Program: B. Tech. - Electronics and Instrumentation 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 has been changed (20% and more)

S.No.	Course Code	Name of the course	Percentage of Syllabus changed	Page Number in which Details are Highlighted
1.	20BT40432	Digital Design Lab	100	3
2.	20BT50251	Control Systems Lab	100	5
3.	20BT51032	Automotive Instrumentation	100	7
4.	20BT71006	SCADA and DCS	100	9
5.	20BT50405	VLSI System Design	100	11
		Average%(A)	100	-
		Total No. of Courses in the Program **(T)**	119	
		No. of Courses where syllabus (more than 20%) has been changed **(N)**	05	
		Percentage of Syllabus content change in the courses **(C)=(AxN)/100**	05	
		Percentage of Syllabus changed in the program(P)=(C/T)*100	**4.20**	

DEAN (Academics)

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

PRINCIPAL

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

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

III B. Tech. – I Semester

(20BT50251) CONTROL SYSTEMS LAB

(Common to ECE & EIE)

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

PRE-REQUISITES: A course on control systems.

COURSE DESCRIPTION: Open and closed loop systems; DC and AC servo motor; stability analysis for mechanical and electrical systems; process control system; design of compensators.

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

CO1. To analyze the performance characteristics of physical system using the principles of control systems.

CO2. To determine the time and frequency domain specifications and investigate the stability of the physical system.

CO3. To design controllers for controlling the dynamics of physical system using the principles of control systems.

CO4. To deploy compensators to analyze the stability of the physical systems.

CO5. Work independently and in teams to solve problems with effective communication.

Practical Exercises/List of Experiments: Minimum **Ten** experiments are to be conducted.

1. Analyse the characteristics of synchro's
2. Determination of transfer function for a given physical system.
3. Determine performance characteristics of DC Motor.
4. Determine time domain specifications of second order system.
5. Analyse stability of Mechanical and Electrical systems.
6. Study and analysis of second order system using frequency response and determination of transfer function from Root Locus.
7. Study and analysis of second order system using frequency response from Bodeplot and Nyquist Plot.
8. Effect of P, PI and PID controllers on a second order system.
9. Analyse stability of a system using R-H criteria

10. Lag, Lead and Lag-lead compensation of a linear time invariant system using Bode plot.
11. Transfer function to state space and vice versa using Matlab.
12. Controllability and Observability using Kalman's test using Matlab

TEXT BOOKS:

1. A. Anand kumar, *Control Systems*, PHI learning Pvt Ltd., 2nd edition, 2014.
2. Katsuhiko Ogata, *Modern Control Engineering*, Pearson Education Publishers, 5th edition, 2010.

ADDITIONAL LEARNING RESOURCES:

1. NPTEL_CONTROL SYSTEMS: https://nptel.ac.in/courses/107/106/107106081/
2. EDX_INTRODUCTION TO CONTROL SYSTEMS: https://www.edx.org/course/introduction-to-control-system-design-a-first-look

III B. Tech. – I Semester

(20BT51032) AUTOMOTIVE INSTRUMENTATION

(Common to ECE & EIE)

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

PRE-REQUISITES: A Course on Transducers in Instrumentation.

COURSE DESCRIPTION: Charging system, Starting system, Ignition system, Safety and warning systems.

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

CO1. Demonstrate knowledge on vehicle electrical systems.

CO2. Identify suitable engine ignition system technology to improve the performance of engine.

CO3. Select an appropriate sensor for measurement of specific parameter in an automotive system.

CO4. Apply contextual knowledge of various instruments to check the vehicle condition.

CO5. Apply contextual knowledge of safety and warning systems while driving.

DETAILED SYLLABUS:

UNIT-I: CHARGING AND STARTING SYSTEM **(7 periods)**

Operation, Requirements, Generator, Direct-current generator, Regulator. Alternator, construction, principle of alternator, advantages of alternator, single-phase and three-phase alternators. Voltage regulator, compensated voltage regulator, regulator characteristics.

Starting system: Functions, Starting requirements, Starter motor, Requirements of starter motor, Principle, Starter construction, Conventional starter motor, Reduction type starter motor, Types of starter motor, Permanent magnet rotor, Characteristics of a starter motor, Starter drive mechanisms, overrunning clutch, starter switches, starter solenoid, Starter relay.

UNIT-II: IGNITION SYSTEM OF SPARK-IGNITED ENGINES **(7 periods)**

Functions and requirements, Ignition energy, Principle of high voltage generation, Components of conventional ignition system, Ignition coil, Distributor, Conventional ignition systems, Comparison of battery ignition and magneto ignition, Ignition advance mechanism. Spark plug, Spark plug location, Parts of a spark plug, Ignition mechanism, electrode quenching, Spark plug resistors, Electrode materials, Ignition performance, Self-cleaning temperature, Pre-ignition temperature, Spark plug heat flow, Spark plug reach, Nose length and heat range, Projecting-electrode spark plug, Platinum-tipped spark plug, Twin tip spark plug.

UNIT-III: ELECTRONIC IGNITION SYSTEM **(7 Periods)**

Types of electronic ignition system, Capacitive discharge ignition system, Solid state transistorized ignition system, Distributor less ignition system, Direct ignition system, Triggering devices, Digital ignition system, Digital twin spark system, Digital twin spark-swirl induction, Digital twin spark-fuel injection, Comparison between single and twin

spark technology, DTS-I triple spark engine, Intelligent-dual sequential ignition, Electronic spark advance.

UNIT-IV: SAFETY AND WARNING SYSTEM **(7 Periods)**

Lighting system: Head light, Halogen headlights, Signal lights, Interior lights, Low beam and high beam operation, Headlight aiming, Headlamp arrangement, Headlight dazzling, Methods to reduce dazzling, Directional warning lamps, LED headlights.

Safety and warning systems: Automobile safety, Crash protection devices, Seat belt, Supplementary restraint system, Crash avoidance features, Electronic stability control, Anti-lock brake system, Electronic brake force distribution, Traction control system, Auto emergency braking, Voice warning system, Collision avoidance radar warning system, daytime running lights, Vehicle cruise control, Tyre pressure monitoring system, Rearview camera, Anti-theft system, Keyless entry system, Door locks.

UNIT-V: ELECTRONIC ENGINE MANAGEMENT & ACCESSORIES **(7 Periods)**

Electronic Engine Management: Sensor principle, Sensors in engine management, Mass air-flow sensor, Manifold pressure sensor, Position sensors, Vehicle speed sensors, Throttle position sensor, Oxygen sensor, Temperature sensor, Detonation sensor, Electronic control unit, Actuators, Feedback carburetor, Electronic gasoline injection system, Modern diesel injection systems.

Accessories: Dashboard instruments, Speedometer, Odometer, Trip meter, Tachometer, Engine and vehicle monitoring system, Fuel gauge, Oil pressure gauge, Temperature gauge, Horn, Windshield wiper, Windshield washer, Power window, Air-conditioner, Components of automobile air-conditioner.

Total Periods: 35

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Robert Bosch, *Automotive Handbook*, Wiley Publications, 9th Edition, 2014.
2. A K Babu, *Automotive Electrical and Electronics*, Khanna Publishing, 2nd Edition, 2020.

REFERENCE BOOK:

1. Robert Bosch, *Safety, Comfort and Convenience Systems: Function, Regulation and Components*, Bentley publishers, 2006.
2. K K Jain, R B Asthana, *Automobile Engineering*, Mc Graw Hill Education (India) Pvt. Ltd. 2014.

ADDITIONAL LEARNING RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc21_de02/preview2.
2. https://www.udemy.com/course/automotive-sensor-and-actuator-technology/

IMPROVEMENTS OVER SVEC19 SYLLABUS:

New Course

IV B. Tech. – I Semester

(20BT71006) SCADA and DCS

Professional Elective-5

(Common to ECE & EIE)

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

PRE-REQUISITES: Sensors and transducers, Programmable Logic Controller.

COURSE DESCRIPTION: SCADA System Architecture, Remote Terminal Units, SCADA Process Graphic Displays, DCS configurations, DCS and supervisory computer displays, DCS Integration with Computers and PLCs, Communications Hierarchy, Network Requirements.

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

CO1. Demonstrate knowledge on various elements of SCADA Software.

CO2. Analyze the industrial process by using various displays in SCADA software and provide appropriate solution.

CO3. Demonstrate knowledge on basics of DCS to interface hardware and software in automation industries.

CO4. Select appropriate protocol to transmit the data between various field devices in DCS by applying fundamental concepts of communication protocols.

DETAILED SYLLABUS:

UNIT- I: THE ELEMENTS OF SCADA SOFTWARE **(9 Periods)**

SCADA System Architecture - Field Devices and Signals, Programmable Process Controller, Communication Network, Central Control Facilities, Display Conventions and Navigation. Remote Terminal Units-Discrete control, analog control, Monitor discrete signals, monitor analog signals. Master terminal Units.

UNIT-II: SCADA WORKS STATION APPLICATION PROGRAMME **(6 Periods)**

Identifying the process areas, configuring HMI applications. Process Graphic Displays-Current Process Operations, Equipment Control Displays, Alarm and Event Summaries, Trends and Historical Reports, Maintenance Displays. Configuration of I/O Server, System graphic displays Sample Application: Water Treatment Plant SCADA System.

UNIT-III: DCS-BASIC PACKAGES **10 Periods)**

Analog control, direct digital control, Distributed process control, DCS configurations. The control console equipment: Video display, key board, peripheral devices. Displays: Group displays, Overview displays, Detail displays, Graphic displays, Trend displays. Communication between components-Data highway designs, highway compatibility, Network access protocols, Network topologies. Local Control Units-Dedicated Card Controllers, Unit Operations Controllers.

UNIT-IV:SYSTEM INTEGRATION WITH PLC AND COMPUTERS **(10 Periods)**

Supervisory control and optimization, production monitoring and control, on-line information system. DCS and supervisory computer displays-Display access method, display features, alarm access architecture, voice input machine interface Man Machine Interface –Sequencing, Supervisory control. Computer interface with DCS-Hardware, Software.Integration with PLCs, Integration with Computers, Integration with Direct I/O ,Serial Linkages, Network Linkages (X.25),Links Between Networks (TCP/IP),DCS Integration with PLCs, DCS Integration with Computers

UNIT-V: COMMUNICATION NETWORK PROTOCOLS IN DCS **(10 Periods)**

Computer-Integrated Processing (CIP), Communications Hierarchy, Network Requirements, ISO Reference Model, Industrial Communication Systems, Management Systems, Fieldbuses, Rackbus ,MODBUS,PROFIBUS,FIP-BUS, International Fieldbus Standard.

Total Periods: 45

TEXT BOOKS:

1. Stuart G. Mc Crady, *Designing SCADA Application Software A Practical Approach*, First edition, Elsevier, 2013.
2. Bela G. Liptak, *Process Control-Instrument Engineers Handbook*,3rd edition,Chilton book co,1995.

REFERENCE BOOKS:

1. Stuart A. Boyer, Supervisory Control and Data Acquisition, 3rd edition, ISA 2004.
2. Practical Distributed Control Systems (DCS) for engineers and technicians by IDC Technologies,2004.

ADDITIONAL LEARNING RESOURCES:

1. https://openautomationsoftware.com/use-cases/allen-bradley-wpf-scada/
2. https://new.siemens.com/global/en/products/automation/industry-software/automation-software/scada.html
3. https://ab.rockwellautomation.com/Programmable-Controllers
4. https://en.wikipedia.org/wiki/SCADA

IMPROVEMENTS OVER SVEC19 SYLLABUS: New Course

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.