Practical sessions integrated with theory courses

VIGNAN'S FOUNDATION FOR SCIENCE, TECHNOLOGY AND RESEARCH

Department of Electrical and Electronics Engineering
B.Tech. R16 Course Structure
II Year - I Semester (R-16)

Sl. No.	Sub. Code	Subjects	Short		Credits
1	16EE201	Linear Systems and Signal Analysis	LSSA	T	4
2	16MS201	Management Science	MS	T	3
3	16EE203	Electrical Circuit Analysis	ECA	T+L+MP	4
4	16EE205	Electromagnetic Fields and Transmission Lines	EMFTL	T	4
5	16EC205	Digital Electronics	DE	T+L+MP	4
6	16EE207	Electronic Devices and Circuit Theory	EDCT	T+L+MP	4
7	16EE203A	Electrical Circuit Analysis Lab	ECA-L		
8	16EC205A	Digital Electronics Lab	DE-L		
9	16EE207A	Electronic Devices and Circuit Theory Lab	EDCT-L		

II Year - II Semester (R-16)

Sl.	Sub. Code	Subjects	Short		Credits
1	16EE202	DC Machines	DCM	T+L+MP	4
2	16EE204	Power Generation Systems	PGS	T+MP	4
3	16EE206	Power Electronic Devices and Circuits	PEDC	T+L+MP	4
4	16EE208	Analog Electronics	AE	T+L+MP	4
5	16EE252	02. Dept. Elective (Power Electronics) --- (E) Alternate Energy Resources	AER	T	4
5	16EE251	03.Dept. Elective (Automation&Energy Systems) (E) Renewable Energy Technologies	RET	T	4
6	16CE281	Open Elective: (1) Civil - Renewable Energy Resources	RER	T	
6	16CS246	(2) IT - Linux/Unix and Shell Programming	LUSP	T	
6	16CS247	(3) CSE - Fundamentals of Data Base Systems	FDBS	T	
6	16HS219	(4) Training - Indian History and Culture	IHC	T	
6	16ME255	(5) Mech - 3D Printing Technology	3DPT	T	
6	16ME256	(6) Mech - Basics in Robotics	BR	T	
7	16EE202A	DC Machines Lab Component	DCM-L		
8	16EE206A	Power Electronic Devices and Circuits Lab Component	PEDC-L		
9	16EE208A	Analog Electronics Lab Component	AE-L		
10	16EL102	Soft Skills Laboratory	SS-L	L	1
		OPEN ELECTIVES			
11	16EE253	II - II : Solar PV Technologies-I	SPVT-I		

III Year-I Semester (R-16)

Sl. No.	Sub. Code	Subjects	Short		Credits
1	16EE301	Control Systems	CS	T+L+MP	4
2	16EE303	Electrical Power Transmission & Distribution	EPTD	T+MP	4
3	16EE305	Electrical Measurements & Instrumentation	EM&I	T+L	3
4	16EE307	Transformers and Induction Motors	T&IM	T+L+MP	4
5	16EE354	Dept. Elective Stream - 2 (Power Electronics) Analysis of Inverters	AI	T + L	4
	16EE355	Dept. Elective Stream-3 (Automation & Energy Systems) Utilization of Electrical Energy	UEE	T	4
6	16CE385	Open Elective: (1) Civil - Environmental Pollution and Control	EPC	T	4
	16CS448	(2) IT - Python Programming	PP	T	
	16CS352	(3) CSE - JAVA Programming	JP	T	
	16HS224	(4) Training - Polity and Governance of India	PGI	T	
	16ME367	(5) Mech - Reverse Engineering	RE	T	
	16ME369	(6) Mech - Advanced in Robotics	AR	T	
7	16EE301A	Control Systems Lab Component	CS-L	L	
8	16EE305A	EM&I Lab Component (Batches-1-20 & 21-Last)	EM&I-L	L	
9	16EE307A	T&IM Lab Component	TIM-L	L	
10	16EE354A	Analysis of Inverters Lab Component	AI-L	L	
11	16EL103	Professional Communication Lab	PC-L	L	
		OPEN ELECTIVES			
12	16EE357	III - I : Solar PV Technologies-II	SPVT-II		

III Year - II Semester (R-16)

Sl.	Sub. Code	Subjects	Short		Credits
1	16HS301	Professional Ethics	PE	T	2
2	16EE302	Power System Analysis	PSA	T	4
3	16EE304	Microprocessors Architectures and Control	MPAC	T+L+MP	4
4	16EE306	Switch Gear and Protection	SGP	T+MP	3
5	16EE308	Synchronous and Special Machines	SSM	T+L+MP	4
6	16EE353	02. Dept. Elective (Power Electronics) (E) Power Semiconductor Devices and Passive Components	PSDPC	T	4
	16EE456	03.Dept. Elective (Automation&Energy Systems)(ME) Advanced Control Systems	ACS	T+L	4
	16CE391	Open Elective:(1)Civil-Principles of Industrial Waste Treatment	PIWT	T	
	16CS353	(2) IT - Statistics Using Python	SUP	T	

7	16CS355	(3) CSE - Internet Technologies	IT	T	4
	16HS307	(4) Training - Economic and Social Development of India	ESDI	T	
	16ME368	(5) Mech - Safety Engineering	SF	T	
	16ME370	(6) Mech - Fiels and Service Robot	FSR	T	
	16MS302	(7) MBA - Finance for Engineering	FE	T	
8	16EE304A	Microprocessors Architectures and Control Lab Comp	MPAC-L	L	
9	16EE308A	Synchronous and Special Machines Lab Component	SSM-L	L	
10	16EE456A	Advanced Control Systems Lab Component	ACS-L	L	
		OPEN ELECTIVES			
11	16EE358	III - II : Design & Economics of PV Systems	DEPVS		

IV Year - I Semester (R-16)

Sl. No.	Sub. Code	Subjects	Short		Credits
1	16EE401	Electric Drives	ED	T+L+MP	4
2	16EE403	Power System Operation and Control	PSOC	T+L+MP	4
3	16EE405	Principles of Digital Signal Processing	PDSP	T	4
4	16EE407	AI Techniques in Electrical Engineering	AITEE	T	4
5	16EE455	Dept. Elective Stream - 2 (Power Electronics) SMPS based Converters	SMPSC	T+MP	4
	16EE356	Dept. Elective Stream-3 (Automation & Energy Systems) Energy Audit, Conservation and Management	EACM	T	4
6	16CE482	Open Elective: (1) Civil - Environmental Impact Assessment	EIA	T	4
	16CS446	(2) IT - Data Science Using Python	DSUP	T	
	16CS448	(3) CSE - Python Programming	PP	T	
	16HS308	(4) Training - Geography and Environmental Concerns of India	GECI	T	
	16ME457	(5) Mech - Product Life Cycle Management	PLCM	T	
	16ME458	(6) Mech - Artificial Intelligence for Robotics	AIROBO	T	
	16MS401	(7) MBA - Engineering Entrepreneurship	EE	T	
7	16EE401A	Electric Drives Lab	ED-L	L	2
8	16EE403A	Power System Operation and Control Lab	PSOC-L	L	2
		OPEN ELECTIVES			
9	16EE459	IV - I : Solar Thermal Conversion Systems	STCS		

IV Year - II Semester (R-16)

Sl.	Sub. Code	Subjects	Short		Credits
1	16EE411	Project			15
2	16EE412	Internship			15

Skill Development Labs

Andhra Pradesh State Skill Development Corporation

TECHNICAL SKILL DEVELOPMENT INSTITUTE

VIGNAN'S

Foundation for Science, Technology & Research

(Deemed to be UNIVERSITY)

-Estd. u/s 3 of UGC Act 1956

The Govt. of AP has formed 7 different 'Missions' to achieve double digit growth for the state and to make AP among the most developed state in the country. Among these, the 'Knowledge and Skills Mission' has been formed to provide trained and skilled manpower to all other Missions.

Aim

Andhra Pradesh State Skill Development Corporation aim is to train the students from different engineering streams to improve their skills and make them industry ready.

Context

To target 20 million people in AP in next 15 years towards skilling and entrepreneurship to meet skilled human power demands of all Missions and shape AP as the skilled-workforce and knowledge hub for the world

Vision

The Government of Andhra Pradesh has the vision (Swarna Andhra Vision 2029) to make Andhra Pradesh among the three best states in India by 2022 when India celebrates its 75th year of independence and to achieve the status of a developed state by 2029.

Mission

Andhra Pradesh itself will have a requirement of approximately 10 million Skilled workers between 2012 till 2022, across the high-priority and emerging sectors.

Vignan's Foundation for Science, Technology and Research is among the select few identified by APSSDC in this region to impart training to the youth in 7 different technical areas. The training will be provided by M/S Siemens Corporation for 2 years and subsequently will hand over the responsibilities to the university after 6 month training by VFSTR University staff under their supervision.

Prof. Ghanta.Subba Rao, Special Secretary to A.P Government, Skill Development, Entrepreneurship and innovation Department; Ex.Officio Secretary to the Hon'ble Chief Minister of Andhra Pradesh; Director, Andhra Pradesh State Skill Development Corporation (APSSDC) has been inaugurated the APSSDC-tSDI labs and the soft launch has been done at VFSTR on 2nd February, 2017.

Areas of
Training & Laboratories

Design / Computer Based Tutorials Laboratory

Description

Design/CBT lab is designed to teach the theory and tools of Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) with an emphasis on the central role of the geometric model in their seamless integration and a focus on the integration of these tools and the automation of the product development cycle.

Objectives

The main objective of this lab is to teach students with the basic and advanced commands and tools necessary for professional 3D part design, assembly and drafting using Siemens Solid Edge and Manufacturing NX software. After completing this course, a student will be able to:

- ✓ Present an overview of CAD and describe its applications in different fields
- ✓ Describe common terms associated with CAD hardware and software.
- ✓ Outline the basic principles associated with CAD and demonstrate common drafting techniques and shortcuts
- ✓ Introduce the advanced capabilities of CAD to increase productivity
- ✓ Provide information about the CAD industry resources
- ✓ Use effectively CAD / CAM systems in order to produce the final NC code for the manufacturing of various mechanical parts and carry out exchange of data between CAD and CAM systems.

Key areas covered

- ✓ Computer-aided design (CAD) (Design)
- ✓ Siemens PLM Software
- ✓ Computer-aided engineering (CAE) (Simulation)
- ✓ Computer-aided manufacturing (CAM) (Manufacturing)
- ✓ POD software for online demonstration of various labs through tutorials

Softwares used

Solid edge, NX CAM, Siemens PLM Software, POD Software
Design/CBT lab syllabus includes 14 modules, which covers Design, CAE and CAM exercises

CNC Machines Laboratory

(Vertical Milling m/c & Lathe)

Description

The Computer Numerical Control (CNC) Laboratory consists of LMW VJ 55 Vertical Machining Centre (VMC), SMARTURN and Siemens Simulation controllers for programming. The CNC laboratory aims to enhance the student's knowledge in development of practical knowledge on CNC machines and the lab caters the skills necessary for the development of a mechanical engineer pursuing further studies and a career in manufacturing area.

Objectives

The main objective of Manufacturing CNC lab is to teach students to understand the basic concepts of computer numerical control (CNC) machine tool, machining methods and CNC programming. The Lab has Production model Smart turn CNC lathe and JV55 vertical machining center CNC milling machines with CAM simulation software's like, SINUTRAIN with Siemens controllers (828D, 802D) for programming simulation, Unigraphics NX10 (CAM). After completing this course, a student will be able to:

✓ Present an overview of CNC and describe its applications in different fields
✓ Outline the basic principles associated with CNC and demonstrate common Machining techniques.
✓ Introduce the advanced capabilities of CNC to increase productivity.
✓ Use effectively CAD/CAM systems in order to produce the final NC code for the manufacturing of various mechanical parts and carry out exchange of data between CAD and CAM systems.

Key areas covered

✓ 1. Computer-aided manufacturing (CAM) (Manufacturing)
✓ 2. POD software for online demonstration of CNC lab through tutorials

Software is used

SINU TRAIN for Sinumeric operate, NX CAM, POD Software, SINUMERIC 8400SL, SINUMERIC 828D/828D Basic training simulation modules.

List of Machinery Available

✓ 1. Model Smart turn CNC lathe
✓ 2. JV55 vertical machining center
✓ 3. Siemens simulation controllers

SKILLS

✓ Turning operations on machine elements like keys, M-codes, G-codes etc.
✓ Milling operations on machine elements like Face milling, tapping and tapper turning.
✓ Machine programming for performing various operations.

OUTCOMES   Able to,

✓ Self programming for machine elements.
✓ Perform milling and turning operations of various jobs.

Welding Laboratory

Description

The Welding course of study provides students with an opportunity to learn about the Industry as it relates to welding. Students will master a variety of welding competencies. Program standards are aligned to the requirements of the American Welding Society (AWS) for a Level I entry-level welder. The Welding Laboratory provides students with an environment where they are able to develop beneficial skills and knowledge in advanced welding techniques and methods. The lab is equipped for most common welding and cutting processes including oxy-fuel welding, shielded metal arc welding, gas tungsten arc welding, gas metal arc welding, resistance spot welding, and oxygen cutting.

Objectives

The main objective of this lab is to teach students with the basic and advanced welding techniques and methods including safety precautions necessary while welding. The course is taught in line with the industrial needs. After completing this course, a student will be able to:

- ✓ Describe and demonstrate proper welding shop safety.
- ✓ Read and interpret symbols and plans utilized in the Welding industry.
- ✓ Demonstrate competency in shielded metal arc welding.
- ✓ Demonstrate competency in metal inert gas welding
- ✓ Demonstrate competency in flux cored arc welding
- ✓ Describe how the effects of heat, metal thickness and metal length influence welding/cutting techniques.
- ✓ Describe how the effects of heat, metal thickness and metal length influence cutting techniques.

Key areas covered

- ✓ Welding safety and precautions
- ✓ Introduction to welding tools and equipment
- ✓ ARC Welding-AC
- ✓ ARC Welding-DC
- ✓ TIG Welding
- ✓ MIG Welding
- ✓ Oxy Acetylene Gas Welding
- ✓ Oxy Acetylene Gas Cutting

List of equipment available

Auto K-400, Easyweld 400-T, RS 400, Migmatic 250, Transweld, Gas welding, Gas Cutting equipment, safety equipment and tools.

SKILLS

- ✓ Learning of basic welding mechanism.
- ✓ Gas cutting of work pieces.
- ✓ Finishing and Grinding of work pieces.
- ✓ Learning of TIG welding method.
- ✓ Learning of MIG welding method.
- ✓ Learning of ARC welding method.
- ✓ Learning of GAS welding method.

OUTCOMES Able to,

- ✓ Perform different welding operation like flat, horizontal, vertical and overhead.
- ✓ Perform gas cutting operation.
- ✓ Refrigeration & Air conditioning lab

Refrigeration & Air Conditioning Laboratory

Description

Refrigeration Technicians, commonly known as Refrigeration Mechanics, repair, install and troubleshoot refrigerating systems. They can work on industrial or residential climate-control systems, such as HVAC units, ice machines, beverage equipment and refrigerated storage units.

Objectives

On completion of This course, the students are expected to gain knowledge about refrigeration and air conditioning system, analysis and design calculations.

The objectives of the course are to enable the student

- ✓ Familiarize the components of refrigeration systems.
- ✓ Understand the principles of refrigeration and air conditioning.
- ✓ To understand vapour compression and vapour absorption system operation.
- ✓ Analyze the refrigeration cycles & methods for improving performance.
- ✓ Design refrigeration & air conditioning systems using cooling load Calculations.
- ✓ Know the application of refrigeration and air conditioning.
- ✓ Energy Conservation and Management.

Key areas covered

- ✓ Various refrigeration cycles and its applications.
- ✓ Applications of variousrefrigerationand air conditioning machines

List of Equipment's Available

Scroll Chiller (Air-cooled) 10 TR, VRF IV Plus system 8 HP, Ducted split unit 5.5 TR - Indoor, Outdoor, Cassette unit 1.5 TR – (Indoor, Outdoor), High wall split (2 star) 1 tr – (Indoor, outdoor), Window unit (2 star) 1 tr – (Indoor, outdoor), Deep Freezer Hard Top 100 Litres, Bottle Cooler Hard Top 300 Litres, Water cooler 20/20 Litres, Bottle Water Dispenser, Cold room 6000 BTU/ Hr - Assembled Unit.

SKILLS

- ✓ Vacuumization of Air-condition system.
- ✓ Refrigerant recharge operation.
- ✓ Brazing operation.
- ✓ Air filter cleaning and replacement.
- ✓ Repair of Compressor and Condenser.

OUTCOMES Able to,

- ✓ Install and maintenance of various A/C Systems.
- ✓ Install and maintenance of various Refrigeration Systems.

Home Electrical Laboratory

Description

Electrical- Home lab is designed to teach the theory, tools of electrical house wiring, estimating and installing of electrical wiring in a safe manner as per the Indian electricity rules.

Objectives

The main objective of this lab is to teach students with the basic and advanced controlling devices, protective devices and tools necessary for wiring in respective of different applications. After completing this course, a student will be able to:

- ✓ Read blueprints or technical diagrams of electrical wiring.
- ✓ Select right and suitable components, devices for controlling and protecting the electrical items and peripherals
- ✓ Install and maintain electrical wiring circuits in a safe manner
- ✓ Inspect and make clearance for giving main supply by avoiding loose contacts in controllers, fuse and circuit breakers.
- ✓ Replace wiring, equipment and protective devices using hand tools and power tools.
- ✓ Learn and follow the Indian Electricity Rules during providing connection and in installation.

Key areas covered

- ✓ Read blueprints, designing basic and completed circuits.
- ✓ Selection and Installation procedures of wiring as per the drawing
- ✓ Study and application of suitable protective devices for circuit protection
- ✓ Safety precautions for avoiding accidents
- ✓ POD software for online demonstration of electrical application through tutorials

Tools used

- ✓ Electrical Workbenches
- ✓ Panel Boards
- ✓ Distribution board
- ✓ Energy meter
- ✓ Modular circuit breakers (MCB)
- ✓ Switches
- ✓ Cutting pliers
- ✓ Stripping pliers
- ✓ Crimping pliers
- ✓ Tester
- ✓ Screwdriver
- ✓ Power drilling machine
- ✓ Hammer
- ✓ Wire strippers
- ✓ Screw guns
- ✓ Multi meter and
- ✓ Lug crimper.

OUTCOMES   Able to,

- ✓ Complete Electrical wiring of 1 BHK and 2BHK flats.
- ✓ Electrical wiring of warehouse.
- ✓ Electrical wiring of Auditoriums.
- ✓ Repair and re-wiring of motors in domestic appliances.
- ✓ Repair and re-wiring of motors in Agriculture.

Home Electronics Laboratory

Description

Electrics- Home lab is designed to teach the theory and rewinding of electronic appliances using in house like mixer, washing machine etc.

Objectives

The main objective of this lab is to gain knowledge about trouble shooting of devices, protective devices and tools necessary for wiring in respective of different applications.

After completing this course, a student will be able to:

- ✓ Rewinding of motors in home appliances like mixer, washing machine etc.
- ✓ Circuit trace out, pin Check and IC replacement in LED TVs.
- ✓ Signal checking and alignment of Dish Antenna in DTH.

Key areas covered

- ✓ Read blueprints, designing basic and completed circuits.
- ✓ Selection and Installation procedures of wiring as per the motor
- ✓ Study and application of suitable protective devices for circuit protection
- ✓ Safety precautions for avoiding accidents
- ✓ POD software for online demonstration of electronic application through tutorials

List of Equipment's Available

- ✓ LED TV and trainer kit
- ✓ Mixer and trainer kit of motor
- ✓ DTH and trainer kit of DTH
- ✓ OVEN and trainer kit of PCB.

SKILLS

- ✓ Rewinding of motors in home appliances like mixer, washing machine etc.
- ✓ Circuit trace out, pin Check and IC replacement in LED TVs.
- ✓ Signal checking and alignment of Dish Antenna in DTH.

OUTCOMES Able to,

- ✓ Repair and maintenance of LED TVs.
- ✓ Repair and maintenance of Mixer.
- ✓ Repair and maintenance of DTH.
- ✓ Repair and maintenance of OVEN.
- ✓ Repair and re-wiring of motors in domestic appliances.

Office & ICT Electronics Laboratory

Description

Office and ICT Electronics Lab is designed to teach the theory and trouble shooting of office equipment like Printer, Scanner, CPU, UPS etc.

Objectives

The main objective of this lab is to gain knowledge about trouble shooting of office equipment, protective devices and tools necessary for wiring in respective of different applications.

After completing this course, a student will be able to:

- ✓ Study and operation of CC cameras.
- ✓ Study and operation of Components in CPU and Laptop.
- ✓ Study and operation of Components in Printer.
- ✓ Study and operation of Components in Scanner.

Key areas covered

- ✓ Read blueprints, designing basic and completed circuits.
- ✓ Selection and Installation procedures of equipment per the application
- ✓ Study and application of suitable protective devices for circuit protection
- ✓ Safety precautions for avoiding accidents
- ✓ POD software for online demonstration of electronic application through tutorials

List of Equipment's Available

CC Cameras and trainer kit, CPU and trainer kit, Printer and trainer kit of motherboard, Scanner and trainer kit of motherboard.

SKILLS

- ✓ Study and operation of CC cameras.
- ✓ Study and operation of Components in CPU and Laptop.
- ✓ Study and operation of Components in Printer.
- ✓ Study and operation of Components in Scanner.

OUTCOMES   Able to,

- ✓ Install and repair of CC cameras.
- ✓ Install and repair of CPU and Laptop.
- ✓ Install and repair of Printer.
- ✓ Install and repair of Scanner.

CM's Skill Excellence Center

Stakeholders & Benefits

- ✓ AP state government +VFSTRU+SIEMENS
- ✓ Rural youth training+ Training in employment oriented program
- ✓ Vignan's management's initiative in supporting this initiative by providing spacious and well furnished infrastructure

Computer simulations for advanced subjects

Computer Simulations Adopted for Advanced Subjects

S.No	Courses	Simulation Tools/ packages used
Computer Science and Engineering (CSE)		
1	VLSI	CADENCE (Virtuoso)
2	Digital Electronics	VHDL (Xilinx) / FPGA Boards (Z Board)
3	Digital Design Through Verilog	
4	Digital Communications	Vector signal generator & Vector signal Analyzer
5	Antennas	HFSS/ Fabrication
6	Electronic Circuit Analysis	PCB
7	Signals & Systems	MATLAB
8	Digital Signal Processing	
9	Digital Image Processing	
10	Microprocessors & Micro Controllers	TASM , H/W Boards
Electronics and Communication Engineering (ECE)		
1	Wireless Computer Networks	NS2
2	Computer Networks	NS2/Ethreal/wireshark/NMAP
3	Data Science using Python	Jupyter/Pandas
4	Software Engineering	Argo UML
5	Data Mining Techniques	WEKA/ Jupyter /Pandas
6	Mobile communication	NS2
7	Cloud Computing	AWS services
8	Pattern Recognition	Jupyter/Pandas/ Numpy
9	Fundamentals of Image Processing	MATLAB
10	Information Security	ZenMap / Wireshark
11	Big Data Analytics	Apache Hadoop / Hive / Spark
Electrical and Electronics Engineering (EEE)		
1	Control Systems	MATLAB
2	Power Systems	
3	Analysis of Inverters	
Mechanical Engineering (MECH)		
1	Machine Drawing	Auto CAD
2	CAD/ CAM	Crew
3	3D Printing	3 D Printing software
4	Computer Aided Simulation	ANSYS