SGT University, Chandu-Budhera, Gurugram
Faculty of Engineering & Technology
Department of Electrical & Electronics Engineering

B. Tech. Electrical & Electronics Engineering

Scheme & Syllabus (2021-22)

Vision of SGT University

"Driven by Research & Innovation, we aspire to be amongst the top ten Universities in the Country by 2022"

Scheme of Examination for B.Tech. (EEE) Program, 1st year

SEMESTER WISE COURSE STRUCTURE 2021-2022

First Semester

S. No.	Subject Code	Course Title	L	T	P	C	Examination marks		Subject Total
							Int.	Ext.	
1		Applied Physics	3	0	0	3	40	60	100
2		Fundamental of Electrical & Electronics Engineering	3	0	0	3	40	60	100
3		Digital Electronics	3	0	0	3	40	60	100
4		Electrical Technology	3	0	0	3	40	60	100
5		Signal and System	3	0	0	3	40	60	100
6		Fundamental of Electrical & Electronics Engineering lab	0	0	2	1	60	40	100
7		Digital Electronics lab	0	0	2	1	60	40	100
8		Electrical Technology Lab	0	0	2	1	60	40	100
9		Object Oriented Programming Lab	0	0	2	1	60	40	100
10.		Value Addition Course-I	2	0	0	2	40	60	100
11		Ability Enhancement Courses (Mandatory Course)	2	0	0	2	40	60	Grade*
		Total	**19**	**0**	**8**	**23**	**480**	**520**	**1000**

Grade*

Score	Grade
90 marks and above	O (Outstanding)
80 marks and above but less than 90 marks	A+ (Excellent)
70 marks and above but less than 80 marks	A (Very Good)
60 marks and above but less than 70 marks	B+(Good)
50 marks to 60 marks	B (Above Average)
Below Minimum Pass marks	F(Fail)

Second Semester

S. No.	Subject Code	Course Title	L	T	P	C	Examination marks		Subject Total
							Int.	Ext.	
1		Applied Mathematics	3	0	0	3	40	60	100
2		Design Thinking	3	0	0	3	40	60	100
3		Electronics Devices	3	0	0	3	40	60	100
4		Basic Analog & digital Communication	3	0	0	3	40	60	100
5		Analog Electronic Circuits	3	0	0	3	40	60	100
6		Electronics Devices Lab	0	0	2	1	60	40	100
7		Analog & digital Communication Lab	0	0	2	1	60	40	100
8		Analog Electronics Circuits Lab	0	0	2	1	60	40	100
9		Workshop Technology Lab	0	0	2	1	60	40	100
10		Engineering Graphics and Design Lab	0	0	2	1	60	40	100
11		Ability Enhancement Courses (Mandatory Course)	2	0	0	2	40	60	Grade*
12		MOOC Course*	0	0	8w	4*	-	-	-
		Total	**17**	**0**	**11**	**22/26***	**500**	**500**	**1000**

Grade*

Score	Grade
90 marks and above	O (Outstanding)
80 marks and above but less than 90 marks	A+ (Excellent)
70 marks and above but less than 80 marks	A (Very Good)
60 marks and above but less than 70 marks	B+(Good)
50 marks to 60 marks	B (Above Average)
Below Minimum Pass marks	F(Fail)

Note:-

1. 4weeks mandatory Industrial Internship of 2 credits after completetion of 1st year.

***** A student will be eligible to get Under Graduate degree with **Honours**, if he/she completes an additional 16 credits. These can be acquired through SWAYAM MOOCs. For that, one MOOC Course of atleat 8

weeks (4 credits) must be completed during First Year. The list of MOOC courses will be provided by the Departement to the students before commencement of the semester.

Exit Point

Certificate Course in Basics of Electrical & Electronics Engineering.

Entry Point

Three years Diploma or One year Certificate Course in Basics of Electrical & Electronics Engineering and in lieu of Industrial Internship of 4 weeks student has to complete MOOC Course of 4 weeks (2 Credits) in 3rd semester.

Scheme of Examination for B.Tech. (EEE) Program 2nd year

SEMESTER WISE COURSE STRUCTURE 2021-2022

Third Semester

S.NO.	Subject Code	Course Title	L	T	P	C	Examination marks		Subject Total
							Int.	Ext.	
1.		Microprocessor and microcontroller	3	0	0	3	40	60	100
2.		Distribution of Electrical system	3	0	0	3	40	60	100
3.		Network Analysis & Synthesis	3	0	0	3	40	60	100
4.		Department Electives-I	3	0	0	3	40	60	100
5.		Open Elective-I	4	0	0	4	40	60	100
6.		Microprocessor and microcontroller Lab	0	0	2	1	60	40	100
7.		Distribution of Electrical system lab	0	0	2	1	60	40	100
8.		Network Analysis & Synthesis Lab	0	0	2	1	60	40	100
9.		Department Electives Lab-I	0	0	2	1	60	40	100
11.		Industrial Internship	0	0	4w	2	60	40	100
12		Ability Enhancement Courses (Mandatory Course)	2	0	0	2	40	60	100
		Total	**18**	**0**	**8**	**24**	**540**	**560**	**1100**

Fourth Semester

S.NO.	Subject Code	Course Title	L	T	P	C	Examination marks		Subject Total
							Int.	Ext.	
1.		Measurements & Instrumentation	3	0	0	3	40	60	100
2.		Power Electronics	3	0	0	3	40	60	100
3.		Research Methodology and IPR	3	0	0	3	40	60	100
4.		Department Electives-II	3	0	0	3	40	60	100
5.		Department Electives-III	3	0	0	3	40	60	100
6.		Open Elective-II	4	0	0	4	40	60	100
7.		Measurements & Instrumentation Lab	0	0	2	1	60	40	100
8.		Power Electronics lab	0	0	2	1	60	40	100
9.		Department Electives Lab-II	0	0	2	1	60	40	100
10.		Department Electives Lab-III	0	0	2	1	60	40	100
11.		Research Methodology and IPR Lab	0	0	2	1	60	40	100
13.		MOOC Course*	0	0	8w	4*	-	-	-
		Total	**19**	**0**	**10**	**24/ 28***	**540**	**560**	**1100**

Note: -

1. 6weeks mandatory Industrial Training-I of 3 credits after completetion of 2nd year.
2. Student can opt for any of the Open Elective subject outside from the Parent Institute leading to Holistic development of student. It may include Yoga, Dance, Fashion, Agriculture, Medicine, etc.
3. Hours for open elective may vary as per course but not credits.
4. The Department has liberty to vary Credits of Core CoursesLab but not for Department Electives Lab. The Department Elective Labs are significant. So, there hours not to be reduced.
5. Department Electives must be selected such that they should not have any year-wise dependency.

***** A student will be eligible to get Under Graduate degree with **Honours**, if he/she completes an additional 16 credits. These can be acquired through SWAYAM MOOCs. For that, one MOOC Course of atleat 8 weeks (4 credits) must be completed during Second Year. The list of MOOC courses will be provided by the Departement to the students before commencement of the semester.

******2nd Year Core Courses along with 4 Department Elective Courses should make a capsule program with some specialization.

Exit Point

Advanced CertificationCourse in Electrical & Electronics Engineering with minor specialization in_____.

Entry Point

Advanced CertificationCourse in Electrical & Electronics Engineering and in lieu of Industrial Training-I of 6 weeks student has to complete MOOC Course of atleast 6 weeks (3 Credits) in 5thsemester.

Scheme of Examination for B.Tech. (EEE) Program SEMESTER WISE

COURSE STRUCTURE 2021-2022

Fifth Semester

S.NO.	Subject Code	Course Title	L	T	P	C	Examination marks		Subject Total
							Int.	Ext.	
1.		Automation in Machinery	3	0	0	3	40	60	100
2.		Arduino	3	0	0	3	40	60	100
3.		Internet of Things	3	0	0	3	40	60	100
4.		Department Electives-IV	3	0	0	3	40	60	100
5.		Open Elective-III	4	0	0	4	40	60	100
6.		Automation in Machinery Lab	0	0	2	1	60	40	100
7.		Arduino lab	0	0	2	1	60	40	100
8.		Internet of Things lab	0	0	2	1	60	40	100
9.		Department Electives Lab-IV	0	0	2	1	60	40	100
11.		Ability Enhancement Courses (Mandatory Course)	2	0	0	2	40	60	100
12.		Industrial Training-I	0	0	6w	3	60	40	100
		Total	**18**	**0**	**8**	**25**	**540**	**560**	**1100**

Sixth Semester

S.NO.	Subject Code	Course Title	L	T	P	C	Examination marks		Subject Total
							Int.	Ext.	
1.		Electrical Machines	3	0	0	3	40	60	100
2.		Analog and Linear Integrated Circuit	3	0	0	3	40	60	100
3.		Python	3	0	0	3	40	60	100
4.		Department Electives-V	3	0	0	3	40	60	100
5.		Open Elective-IV	4	0	0	4	40	60	100
6.		Electrical machines lab	0	0	2	1	60	40	100
7.		Analog and Linear Integrated Circuit lab	0	0	4	2	60	40	100
9.		Python Lab	0	0	2	1	60	40	100
10.		Department Electives Lab-V	0	0	2	1	60	40	100
11.		Value Addition Course-II	2	0	0	2	40	60	100
13.		MOOC Course*	0	0	8w	4*	-	-	-
		Total	**18**	**0**	**10**	**23/ 27***	**480**	**520**	**1000**

Note:-

1. 6weeks mandatory Industrial Training-II of 3 credits after completetion of 1st year.
2. Student can opt for any of the Open Elective subject outside from the Parent Institute leading to Holistic Development of student. It may include Yoga, Dance, Fashion, Agriculture, Medicine, etc.
3. Hours for open elective may vary as per course but not credits.
4. The Department has liberty to vary Credits of Core CoursesLab but not for Department Electives Lab. The Department Elective Labs are significant. So, there hours not to be reduced.
5. Department Electives must be selected such that they should not have any year-wise dependency.

***** A student will be eligible to get Under Graduate degree with **Honours**, if he/she completes an additional 16 credits. These can be acquired through SWAYAM MOOCs. For that, one MOOC Course of atleat 8 weeks (4 credits) must be completed during Third Year. The list of MOOC courses will be provided by the Departement to the students before commencement of the semester.

******3rd Year Core Courses along with 4 Department Elective Courses should make a capsule program with some specialization.

*******Students entring directly in 2nd and 3rd year with CertifciateCourse and AdvancedCertification Course will be given Undergradute Diploma considering their credits of previous courses after successfully completion of 3rd year but the student need to submit his original previous certificate.

Exit Point

Undergraduate Diploma in Electrical & Electronics Engineering with specialization in_____.

Entry Point

Undergraduate Diploma in Electrical & Electronics Engineering and and in lieu of Industrial Training of 6 weeks student has to complete MOOC Course of atleast6 weeks (3 Credits) in 7thsemester.

Scheme of Examination for B.Tech. (EEE) Program 4th year

SEMESTER WISE COURSE STRUCTURE 2021-2022

Seventh Semester

S.NO.	Subject Code	Course Title	L	T	P	C	Examination marks		Subject Total
							Int.	Ext.	
1.		Control System	3	0	0	3	40	60	100
2.		Java	3	0	0	3	40	60	100
3.		Department Electives-VI	3	0	0	3	40	60	100
4.		Control System lab	0	0	4	2	40	60	100
5.		Java Lab	0	0	4	2	60	40	100
6.		Department Electives Lab-VI	0	0	4	2	60	40	100
7.		Capstone Project	0	0	4	2	60	40	100
		Total	**09**	**0**	**16**	**17**	**360**	**340**	**700**

Eighth Semester

S.NO.	Subject Code	Course Title	L	T	P	C	Examination marks		Subject Total
							Int.	Ext.	
1.		Major Project (Industrial oriented/Research oriented)	-	-	20W	**10**	100	100	**200**
2.		MOOC Course*	-	-	8w	**4***			
	Total Credits = 10/14*								
	Overall Total Credits = I to VIII= 168/184*								

***** A student will be eligible to get Under Graduate degree with **Honours**, if he/she completes an additional 16 credits. These can be acquired through SWAYAM MOOCs. For that, one MOOC Course of atleat 8 weeks (4 credits) must be completed during Fourth Year. The list of MOOC courses will be provided by the Departement to the students before commencement of the semester.

Exit Point

Under Graduate Degree in Electrical & Electronics Engineering with specialization in_____.

List of Departmental Electives (B.Tech)					
Specialization	**Communication Technology**	**VLSI Design Embedded System**	**Energy Generation**	**Smart Device**	**Medical Electronics**
DE-I	5G: Architecture & Communication Technology	VLSI Fabrication Technology	Transmission and Distribution	Robotics	Bio Medical Instrumentation
DE-II	Network Security	Digital VLSI	Turbine based Power Generation System	PLC & SCADA	Bio Signal Analysis
DE-III	Electromagnetic Field Theory	Analog VLSI	Wind And Solar Electrical Systems	Industrial Automation	Pattern recognition and machine learning
DE-IV	Adhoc Network	VHDL & Verilog	Thermal & Hydro Power Plant	Mechatronics	Medical sensors
DE-V	Antenna Design	Fundamentals of VLSI CAD	Power Switching Converters	Micro computing system	Hospital Utility
DE-VI	Green Wireless Sensor Network	Sensor & Interfacing	High Voltage Engineering	Distribution system automation	Operation Theater Environment Monitoring

B.Tech EEE_2021

Semester 1

1. Name of the Department: Electrical and Electronics Engineering						
2. Course Name	Applied Physics			**L**	**T**	**P**
3. Course Code				3	0	0
4. Type of Course (use tick mark)		**Core ()**	**EAS ()**	**BSC (√)**	**OE ()**	**OE ()**
5. Pre-requisite (if any)	Intermediate courses	**6. Frequency (use tick marks)**	Even ()	Odd (√)	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 42	**Tutorials = 0**	**Practical = 0**

8. Course Description:

Engineering physics course provide an opportunity to students to learn fundamental concepts of physics and apply these concepts in today's rapidly changing and highly technical/engineering environment. This course also emphasizes the solid foundations of modern scientific principles.

9. Course Objectives:

i) To give students a basic exposure to Physics that will better prepare them for more rigorous courses that will be taken later on.
ii) To make students learn about the concepts of physics
iii) To understand basic concepts of physics to analyze practical engineering problems
iv) To understand basic principles of physics and apply its solutions effectively and meaningfully.

10. Course Outcomes (COs):

At the completion of this course, students will be able to:
i) Describe the behavior of and make predictions regarding the phenomena of the physical world.
ii) Apply fundamental principles of physics to solve problems relating to waves, crystal structure, band theory of solids, quantum physics and special theory of relativity.
iii) Understand the importance of record-keeping.
iv)To have practiced its use during labs and/or lectures.

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the unit: Wave Optics**

Interference: Coherent sources, conditions for sustained interference. Division of Wave-Front - Fresnel's Biprism, Division of Amplitude- Newton's Rings, applications.

Diffraction: Difference between interference and diffraction, Fraunhofer and Fresnel diffraction. Fraunhofer diffraction through a single slit, Plane transmission diffraction grating, dispersive power and resolving power of grating.

Polarization: Polarized and unpolarised light, uniaxial crystal, double refraction, Nicol prism, Quarter and Half wave plates, Detection and production of different types of polarized light.

Unit - 2	**Number of lectures = 12**	**Title of the unit: Crystal Structure and Band theory of solids**

Crystal Structure: Space lattice, unit cell and translation vector, Miller indices, simple crystal structure, Bragg's law, defect in solids.

Free Electron Theory: Elements of classical free electron theory and its limitations. Drude's theory of conduction, quantum theory of free electrons, Fermi level, density of states, Fermi-Dirac distribution function.

Band Theory of solids: Origin of energy bands, Kroning-Penney model ,E-K diagrams, Brillouin zones, Concept of effective mass and holes, Classification of solids into metals, semiconductors and insulators, Hall effect and its applications.

Unit - 3	**Number of lectures = 10**	**Title of the unit: Special Theory of RelativityLaser and Quantum Physics**

Special Theory of Relativity: Postulates of special theory of relativity, Lorentz transformations. Consequences of LT (length contraction and time dilation). Variation of mass with velocity, Mass energy equivalence.

Quantum Physics: Inadequacies of classical physics, introduction to quantum mechanics-simple concepts, Black body radiations Discovery of Planck's constant, wave particle duality, phase velocity and group velocity. Schrodinger wave equations-time dependent and time independent, Expectation value, particle in a one-dimensional box.

Unit - 4	**Number of lectures = 10**	**Title of the unit: LASER and Electromagnetic theory**

LASER: Spontaneous and Stimulated emission, characteristics of laser beam, principle of laser, lasing action, three level laser, four level laser, He-Ne laser, applications.

Fiber Optics: Propagation of light in optical fibers, numerical aperture, V-number, single and multimode fibers, attenuation, dispersion, applications**.**

Electromagnetic theory: Gradient, divergence and curl, stokes theorem, gauss- divergence theorem, gauss law, faraday law, ampere circuital law, displacement current, Maxwell's equation.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Books:

i. Modern Physics for Engineers – S.P.Taneja (R. Chand)

Reference Books:

i. Engineering Physics – SatyaPrakash (PragatiPrakashan)
ii. Modern Engineering Physics – A.S.Vasudeva (S. Chand)
iii. Perspectives of Modern Physics - Arthur Beiser (TMH)
iv. Optics - AjoyGhatak (TMH)
v. Fundamentals of Physics – Resnick & Halliday (Asian Book)
vi. Introduction to Electrodynamics- David J. Griffiths (PEARSON)

1. **Name of the Department :** Electrical and Electronics Engineering										
2. Course Name	Fundamental of Electrical & Electronics Engineering		L		T		P			
3. Course Code			3		0		0			
4. Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**		**PE ()**			
5. Pre-requisite (if any)	Knowledge of Basic Algebra, Basic Electronics		**6.** Frequency (use tick marks)		Even ()	Odd (√)	Either Sem ()	Every Sem ()		
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)										
Lectures = 42			Tutorials = 00		Practical = 00					

8. Brief Syllabus: This course aims to (1) equip the students with an understanding of the fundamental principles of electrical engineering(2) provide an overview of evolution of electronics, and introduce the working principle and examples of fundamental electronic devices and circuits (3) provide an overview of evolution of communication systems, and introduce the basic concepts in radio communication.

9. Learning objectives:

i. Understand the basic essential terms in electricity.
ii. Know the concept of series and parallel circuits.
iii. Understand DC and AC fundamentals.
iv. Know the basic ideas about batteries.

10. Course Outcomes: On completion of this course, the students will be able to

i. Solve problems based on current division rules & Wye-Delta Transformation .
ii. Problems on parallel magnetic circuits
iii. Problems on composite magnetic circuits
iv. Define operating point in the context of a PN Junction Diode

Unit-1	**Number of lectures = 10**	**Title of the unit: Elementary concepts of DC electric circuits:**

Basic Terminology including voltage, current, power, resistance, emf; Resistances in series and parallel; Current and Voltage Division Rules; Capacitors & Inductors: V-I relations and energy stored. Ohm's Law and Kirchhoff's laws-Problems; Star-delta conversion (resistive networks only-derivation not required)-problems. Analysis of DC electric circuits: Mesh current method - Matrix representation - Solution of network equations. Node voltage methods-matrix representation-solution of network equations by matrix methods. Numerical problems

Unit - 2	**Number of lectures = 12**	**Title of the unit: Magnetic Circuits: Basic Terminology:**

MMF, field strength, flux density, reluctance - comparison between electric and magnetic circuits- Series and parallel magnetic circuits with composite materials, numerical problems. Electromagnetic Induction: Faraday's laws, problems, Lenz's law- statically induced and dynamically induced emfs - Self-inductance and mutual inductance, coefficient of coupling Alternating Current fundamentals: Generation of alternating voltages-Representation of sinusoidal waveforms: frequency, period, Average, RMS values and form factor

of waveforms-Numerical Problems

Unit - 3	Number of lectures = 10	Title of the unit: Introduction to Semiconductor devices:

Evolution of electronics – Vacuum tubes to nano electronics. Resistors, Capacitors and Inductors (constructional features not required): types, specifications. Standard values, color coding. PN Junction diode: Principle of operation, V-I characteristics, principle of avalanche breakdown. Bipolar Junction Transistors: PNP and NPN structures, Principle of operation, relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration

Unit 4	Number of lectures = 10	Title of the unit: Basic electronic circuits and instrumentation

Rectifiers and power supplies: Block diagram description of a dc power supply, Working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response, Concept of voltage divider biasing. Electronic Instrumentation: Block diagram of an electronic instrumentation system. .

11. Brief Description of self learning / E-learning component:

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

12. Books Recommended (Text Books):

i) Text books: D P Kothari and I J Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.

13. Reference Books :

i. Del Toro V, “Electrical Engineering Fundamentals”, Pearson Education.
ii. T. K. Nagsarkar, M. S. Sukhija, “Basic Electrical Engineering”, Oxford Higher Education.
iii. Hayt W H, Kemmerly J E, and Durbin S M, “Engineering Circuit Analysis”, Tata McGraw-Hill
iv. Hughes, “Electrical and Electronic Technology”, Pearson Education.

1. Name of the Department- Electrical and Electronics Engineering								
2. Course Name	**Fundamental of Electrical & Electronics Engineering lab**		**L**	**T**		**P**		
3. Course Code			3	**0**		**4**		
4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**		**PE ()**		
5. Pre-requisite (if any)	Knowledge of Basic Algebra, Basic Electronics		**6. Frequency (use tick marks)**	Even ()	Odd (✔)	Either Sem ()	Every Sem ()	
7. Total Number of Lectures, Tutorials, Practical (assuming 12 weeks of one semester)								
Lectures = 0			**Tutorials = 0**	**Practical = 28**				

8. Course Description

Course introduces to fundamental of Electrical & Electronics lab; students will learn to use This course aims to (1) equip the students with an understanding of the fundamental principles of electrical engineering(2) provide an overview of evolution of electronics, and introduce the working principle and examples of fundamental electronic devices and circuits (3) provide an overview of evolution of communication systems, and introduce the basic concepts in radio communication.

9. Learning Objectives:

i. To Design Electrical Systems.
ii. To Analyze A Given Network By Applying Various Network Theorems.
iii. To Expose The Students VOLTMETER, AMMETER, WATTMETER.
iv. To Expose The Students To The Operation Of PN Junction Diode.
v. To Examine Half Wave Rectifiers.

10. Course Outcomes (COs):

The students will be able to:-

i. Knowledge about PN junction diodes and study about basic equipments..
ii. Solve problems with Mesh/node analysis.
iii. Solve problems on Wye-Delta Transformation.
iv. Problems on series magnetic circuits

11. S.No	**List of Experiment**	**CO covered**
1	Verification of KVL and KCL.	**ii**
2	To study Star-delta conversion.	**iii**
3	To study PN Junction diodes.	**i**
4	To study voltmeter, ammeter, wattmeter & multimeter.	**i**
5	Plot the forward and reverse V-I Characteristics of a PN junction Diode.	**i**
6	To plot and study the input and output characteristics of BJT in Common Emitter Configuration.	**ii**

7	To determine resonant frequency, bandwidth and Q-factor for series and parallel RLC circuits.	**iii**
8	To determine the Transmission and Hybrid parameters of a Two-port network.	**iii**
9	To find the resonant frequency, quality factor and bandwidth of a given series and parallel resonant circuits.	**iv**
10	To study Light Emitting Diodes.	**i**
11	To get familiar with the working and use of a seven segment display.	**i**
12	To Study Half – Wave Rectifier.	**i**

1. **Name of the Department :** Electrical and Electronics Engineering

2.Course Name	Digital Electronics	L	T	P
3.Course Code		3	0	0

4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**OE ()**

5.Pre-requisite (if any)	Knowledge of Basic Algebra, Basic Electronics	**6.Frequency (use tick marks)**	Even (√)	Odd ()	**Either Sem ()**	Every Sem ()

7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 42	Tutorials = 00	Practical = 00

8.Brief Syllabus: The course introduces Boolean algebra, Reduction techniques and demonstrates the design of logic gates. Knowledge of digital systems design based on combinational and sequential logic is also imparted. This course further teaches about PLD, Memories and Logic Families.

9.Learning objectives:

- **i.** Understanding the different number systems used in computerized system and
- **ii.** Understanding the different codes used to represent the digits and fundamental of arithmetic operation using each number system and codes.
- **iii.** Understanding the minimization of logic expression and designing combinational and sequential digital circuits
- **iv.** Enabling students to take up application specific sequential circuit to specify the finite state machine and designing the logic circuit.

9.Course Outcomes: On completion of this course, the students will be able to

- **i.** Verify and analyze the input/output data of each logic gates.
- **ii.** Verify and analyze the input/output data of logic circuits such as adders, counters, coders, etc
- **iii.** Apply the digital circuit design concept in developing basic component of computer organization,
- **iv.** Apply the digital circuit design concept in developing basic projects or experiments.

10 .Unit wise detailed content

Unit-1	**Number of lectures = 12**	**Title of the unit:** Number System and Boolean algebra

Review of number system; types and conversion, codes. Boolean algebra: De-Morgan's theorem, switching functions, Prime Implicants and Essential Prime Implicants definition and simplification using K-maps up to 5 variables & Quine McCluskey method.

Unit - 2	**Number of lectures = 10**	**Title of the unit:** Combinational Circuits

Introduction to Logic Gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR and their combinations. Design of adder, subtractors, comparators, code converters, encoders, decoders, multiplexers and de-multiplexers, Function realization using gates & multiplexers.

Unit - 3	**Number of lectures = 10**	**Title of the unit:** Synchronous Sequential Circuits

Introduction to Latches and Flip flops - SR, D, JK and T. Design of synchronous sequential circuits – Counters, shift registers. Finite State Machine Design, Analysis of synchronous sequential circuits;, state diagram; state reduction; state assignment with examples.

Analysis of asynchronous sequential machines, state assignment, asynchronous design problem.

Unit 4	Number of lectures = 10	Title of the unit: Programming Device
Memories: ROM, RAM, PROM, EPROM, Cache Memories, And PLA, PLD, And FPGA, digital logic families: TTL, ECL, CMOS.		
11.Brief Description of self learning / E-learning component: The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal. http://sgtlms.org Journal papers; Patents in the respective field.		
12. Books Recommended		
Text Book:		
i) Mano, Morris. "Digital logic." Computer Design. Englewood Cliffs Prentice-Hall (1979).		
Reference Books :		
i) Floyd, Thomas L. Digital Fundamentals, 10/e. Pearson Education India, 1986.		
ii) Kumar, A. Anand. Fundamentals of Digital Circuits 2Nd Ed. PHI Learning Pvt. Ltd., 2009.		
iii) Malvino, Albert Paul, and Donald P. Leach. Digital principles and applications. McGraw-Hill, Inc., 1986.		
iv) Jain, Rajendra Prasad. Modern Digital Electronics 3e. Tata McGraw-Hill Education, 2003.		

1. **Name of the Department** : Electrical and Electronics Engineering							
2. Course Name	Digital Electronics Lab	L		T		P	
3. Course Code		0		0		2	
4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**OE ()**		
5. Pre-requisite (if any)	Knowledge of Basic Algebra, Basic Electronics	**6. Frequency (use tick marks)**	Even()	Odd (√)	Either Sem ()	Every Sem ()	
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 0		**Tutorials =** 00		**Practical =** 28			

8. Brief Syllabus

The course introduces Boolean algebra, Reduction techniques and demonstrates the design of logic gates. Knowledge of digital systems design based on combinational and sequential logic is also imparted. This course further teaches about PLD, Memories and Logic Families.

9. Learning objectives:

- **i.** Understanding the different number systems used in computerized system and codes.
- **ii.** To represent the digits and fundamental of arithmetic operation using each number system and codes.
- **iii.** Understanding the minimization of logic expression and designing combinational and sequential digital circuits
- **iv.** Enabling students to take up application specific sequential circuit to specify the finite state machine and designing the logic circuit.

10. **Course Outcomes**: On completion of this course, the students will be able to

- **i.** Verify and analyze the input/output data of each logic gate
- **ii.** Verify and analyze the input/output data of logic circuits such as adders, counters, coders, etc.
- **iii.** Apply the digital circuit design concept in developing basic component of computer organization,
- **iv.** Apply the digital circuit design concept in developing basic projects or experiments.

11 .Sr. No.	**List of Experiments**	**CO covered**
1	Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, gates using TTL ICs concept of Vcc and ground, verification of the truth tables of logic gates using TTL	i
2	Implementation of the given Boolean function using logic gates in both SOP and POS forms	i
3	Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.	ii

4	Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates	ii
5	Implementation of 4x1 multiplexer using logic gates.	ii
6	Implementation of 4-bit parallel adder using 7483 IC	ii
7	Design, and verify the 4-bit synchronous counter	iii
8	Design, and verify the 4-bit asynchronous counter	iii
9	Static and Dynamic Characteristic of NAND and Schmitt-NAND gate(both TTL and MOS)	iv
10	Study of Arithmetic Logic Unit	iv

1. Name of the Department: Electrical and Electronics Engineering							
2. Course Name	Electrical Technology	**L**		**T**		**P**	
3. Course Code		3		0		0	
4. Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**		**OE ()**	
5. Pre-requisite (if any)	Physics and Mathematics at +2 or Equivalent Level	**6. Frequency (use tick marks)**		Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		**Tutorials = 0**		**Practical = 00**			

8. Brief Syllabus

Electrical Technology is a field of engineering that deals with the study and applications of laws and theorems in electrical and electronic systems. The course covers the analysis of electrical, analog and digital electronic circuits. Upon completion, students should be able to deal with the various devices and able to construct the circuits for given specification, and also able to analyze and troubleshoot designed electronic circuits using related equipment.

9. Learning objectives:

This course gives an idea to students about analyzing and solving different electrical and electronic circuits by applying different laws and theorems. The objectives are:

- **i.** To prepare students to know the characteristics of different semiconductor devices
- **ii.** Explain the fundamental principles necessary for the analysis and design of analog integrated circuits at transistor level.
- **iii.** Explain the fundamental principles necessary for design of analog integrated circuits at transistor level.

10. Course Outcomes (COs):

On completion of this course, the student should be able to:

- **i.** Understanding various theorems.
- **ii.** Apply theorems to solve different electrical circuits.
- **iii.** Identify different electronic devices.
- **iv.** Apply subject knowledge and solve electronic device problems.

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the unit: DC Network Laws and Theorems**

Concepts of network, Active and passive elements, Ohm's law and its limitations, Kirchhoff's laws, Nodal and Loop methods of analysis, Star to Delta & Delta to Star transformation.

Thevenin's theorem, Norton's theorem, Superposition theorem, maximum power transfer theorem, Millman's theorem.

Unit - 2	Number of lectures = 10	Title of the unit: Single Phase AC Circuits

Sinusoidal signal, Instantaneous and peak values, RMS and average values, crest and peak factor, Concept of phase, representation-polar & rectangular, exponential and trigonometric forms, behaviors of R, L and C components in A. C. circuits.

Series and parallel A.C. circuits, Concept of active and reactive power, power factor, series and parallel resonance, Q factor, cut-off frequencies and bandwidth.

Unit - 3	Number of lectures = 12	Title of the unit: 3-Phase Circuits, Magnetic Circuits & Single Phase Transformers.

Three Phase A.C. Circuits, Magnetic Circuits & Transformer: Three phase system and its necessity and advantages, Balanced supply and balanced load, Line and phase voltage/current relations, Three-phase power and its measurement by two Wattmeter method.

Magnetic Circuits: Magnetic Effects of Electric Current; Magnetization Characteristics; Electromagnetic, Induction and Self and Mutual Inductance; Hysteresis and Eddy Current Losses.

Introduction to different Electrical measuring Instruments i.e. Wattmeter, Ammeter, voltmeter and Energy meter

Single Phase Transformers: Construction, Ideal Transformer, Transformer under No-Load and Loading Conditions, Phasor diagram under different Load conditions, Equivalent Circuit of Transformer, O.C and S.C test on transformer, Voltage Regulation Efficiency of a transformer.

Unit - 4	Number of lectures = 10	Title of the unit: DC Machines, 3-Phase induction Motor and Synchronous Machines

DC machines: Construction, EMF Equation, Torque Equation, Circuit Model – Generating and Motoring Modes. Armature Reaction, Methods of Excitation, Characteristics of DC Motors, Speed Control of Shunt Motor (Field and Armature Control), DC Motor Starting, Application of DC Motors.

Three Phase Induction Motor: Types, Principle of operation, Slip-torque characteristics, Applications

Synchronous Machines: Construction, Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor with applications.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended:

TEXT BOOKS:

i) Basic Electrical Engineering (2nd Edition), Kothari, TMH.

REFERENCE BOOKS:

i) Basic Electrical Engineering", S N Singh; Prentice Hall International.

ii) Electrical technology, (Volume I, II), B L Theraja& A K Theraja, S. Chand & Company.
iii) Electric Machines, I.J. Nagrath and D.P. Kothari, Tata McGraw-Hill Publishing Company Limited.
iv) Electrical and Electronics Technology, Edward Hughes; Pearson Education.

1. **Name of the Department** : Electrical and Electronics Engineering							
2.Course Name	**Electrical Technology laboratory**	L		T		P	
3.Course Code		0		0		2	
4. Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**OE ()**		
5. Pre-requisite (if any)	Physics and Mathematics at +2 or Equivalent Level	**6. Frequency (use tick marks)**	Even ()	Odd (√)	Either Sem ()	Every Sem ()	
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 0		**Tutorials =** 00		**Practical =** 28			

8. Brief Syllabus

Electrical Technology Laboratory is a field of engineering that deals with the study and applications of laws and theorems in electrical and electronic systems. The course covers the analysis of electrical, analog and digital electronic circuits.

9. Learning objectives:

This course gives an hand on practice to students about analyzing and solving different electrical and electronic circuits by applying different laws and theorems. The objectives are:

- **i.** To design and study the characteristics of different semiconductor devices
- **ii.** Explain the fundamental principles necessary for the analysis
- **iii.** To design of analog integrated circuits at transistor level.

10. **Course Outcomes**: On completion of this course, the students will be able to

- **i.** Understanding various theorems.
- **ii.** Apply theorems to solve different electrical circuits.
- **iii.** Identify different electronic devices.
- **iv.** Apply subject knowledge and solve electronic device problems.

11 .Sr. No.	**List of Experiments**	**CO covered**
1	To study and verify Kirchhoff's Voltage and Current Laws.	i
2	To study and verify Thevenin's theorem.	i
3	To study and verify Norton's theorem.	ii

4	To study and verify Superposition theorem.	ii
5	To study and verify Maximum power transfer theorem.	ii
6	To study frequency response of RLC series circuit and find out its quality factor and resonance frequency.	ii
7	To study frequency response of RLC parallel circuit and find out its quality factor and resonance frequency.	iii
8	To study O.C and S.C tests on transformer.	iii
9	To study various type of meters.	iv
10	To perform direct load test of a transformer and plot efficiency v/s load characteristics.	iv
11	To perform direct load test of a DC shunt generator and plot load voltage v/s load current curve.	iv
12	To study the working of DC machines	iii

1. Name of the Department- Electrical & Electronics Engineering							
2. Course Name	**Signal and System**		**L**	**T**		**P**	
3. Course Code			**3**	**0**		**0**	
4. Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**		**OE ()**	
5. Pre-requisite (if any)	**Engineering Mathematics-II**	**6. Frequency (use tick marks)**	Even (□)	Odd (√)	Either Sem()	Every Sem (2)	
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		**Tutorials = 0**	**Practical = 0**				

8. Course Description

This subject is about the mathematical representation of signals and systems. The most important representations we introduce involve the frequency domain – a different way of looking at signals and systems, and a complement to the time-domain viewpoint. Indeed engineers and scientists often think of signals in terms of frequency content, and systems in terms of their effect on the frequency content of the input signal.

9. Learning objectives:

The students will learn and understand

i) Determination of system response for a signal.
ii) Fourier transform techniques as tool for signal analysis.
iii) Z transform techniques as tool for signal analysis.

10. Course Outcomes (COs):

On completion of this course, the students will be able to

i) To Demonstrate an understanding of the relation among the transfer function, convolution, and the impulse response,
ii) To explain the relationship, and using the relationship to solve forced response problems.
iii) Demonstrate an understanding of the relationship between the stability and causality of systems and the region of convergence of their Laplace transforms.
iv) To explaining the relationship, and using the relationship to determine the stability and causality of systems

11. Unit wise detailed content

Unit-1	**Number of lectures = 12**	**Title of the unit: Introduction to Signals & Systems**
Definition, types of signals and their representations: continuous-time/discrete-time, periodic/non-periodic, even/odd, energy/power, deterministic/ random, one dimensional/ multidimensional; commonly used signals (in continuous-time as well as in discrete-time): unit impulse, unit step, unit ramp (and their inter-relationships), exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals (including transformations of independent variables)		
Unit – 2	**Number of lectures = 10**	**Title of the unit: Laplace-Transform (LT) and Z-transform**

One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC), One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping.		
Unit – 3	**Number of lectures = 10**	**Title of the unit: Fourier Transforms (FT)**
Definition, conditions of existence of FT, properties, magnitude and phase spectra, Some important FT theorems, Parseval's theorem, Inverse FT, relation between LT and FT, Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT.		
Unit – 4	**Number of lectures = 10**	**Title of the unit: Linear Time Invariant**
Continuous Time Systems: Linear Time invariant Systems and their properties. Differential equation & Block diagram representation, Impulse response, Convolution integral, Frequency response (Transfer Function), Fourier transforms analysis. Discrete Time System: Difference equations, Block diagram representation, Impulse response, Convolution sum, MATLAB tutorials.		

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Books

i) P. Ramakrishna Rao, `Signal and Systems' 2008 Ed., Tata McGraw Hill, New Delhi

Reference Books:

i) "Signals and Systems: Continuous and Discrete" by R F Ziemer and D R Fannin

ii) "Signals and Systems : Pearson New International Edition" by Alan V Oppenheim and S Hamid

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1. **Name of the Department** : Electrical and Electronics Engineering

2.Course Name	Object Oriented Programming Lab	L	T	P
3.Course Code		0	0	2

4. Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**OE ()**

5. Pre-requisite (if any)	NA	**6. Frequency (use tick marks)**	Even ()	Odd (√)	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials =** 00	**Practical =** 28

8. Brief Syllabus

Electrical Technology Laboratory is a field of engineering that deals with the study and applications of laws and theorems in electrical and electronic systems. The course covers the analysis of electrical, analog and digital electronic circuits.

9. Learning objectives:

i. To understand fundamentals of programming such as variables, conditional and iterative execution, methods,etc.
ii. To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries,etc
iii. To have the ability to write a computer program to solve specified problems

10. **Course Outcomes**: On completion of this course, the students will be able to

i. Understand the features of C++ supporting object oriented programming.
ii. Understand the relative merits of C++ as an object oriented programming language.
iii. Understand th features of C++ supporting object oriented programming.
iv. Understand the relatives merits of C++ as an object oriented programming language.

11 .Sr. No.	**List of Experiments**	**CO covered**
1	Simple C++ programs to implement various control structures. a. if statement b. switch case statement and do while loop c. for loop d. while loop	i
2	Programs to understand structure &unions. a. structure b. union	i
3	Programs to understand pointerarithmetic.	ii
4	Functions &Recursion	ii
5	Inline functions	ii
6	Programs to understand different function call mechanism.	ii

	a. call by reference b. call by value	
7	Programs to understand storage specifiers	iii
8	Constructors &destructors.	iii
9	Use of –this ‖ pointer using class	iv
10	Programs to implement inheritance and functionoverriding. a. multiple inheritance –accessSpecifiers b. hierarchical inheritance – function overriding /virtualFunction	iv
11	Programs to overload unary & binary operators as member function &non member function. a. unary operator as member function b. binary operator as non member function	iv
12	Programs to understand friend function & friend Class. a. friend Function b. friend class	iii
13.	Create a C++ program which takes two distances in inch-feet system and stores in data members of two structure variables. Then, this program calculates the sum of two distances and displaysit.	ii

Second semester

1. Name of the Department- Electrical and Electronics Engineering							
2. Course Name	**Applied Mathematics**	**L**	**T**		**P**		
3. Course Code		**3**	**0**		**0**		
4. Type of Course (use tick mark)		**Core ()**	**EAS ()**		**BSC (√)**	**OE ()**	**OE ()**
5. Pre-requisite (if any)	+2 math	**6. Frequency (use tick marks)**	Even (√)	Odd ()		Either Sem()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		**Tutorials = 0**	**Practical = 0**				

8. Course Description

Introduction to applied mathematics and their applications like differential equations, matrix and set theory, recursive programming, multiple integrations and Laplace transform be the tool for solving the real life problems in engineering & sciences. Enhance and develop the ability of using the language of mathematics in analyzing the real world problems of sciences and engineering.

9. Learning Objectives:

- **i.** To provide basic and theoretical competencies that is majorly used in Computer Science. To help students understand and appreciate the basic mathematical knowledge which is fundamental to Computer Science.
- **ii.** To aware students about computer, its functions and utilities.
- **iii.** To promote the development of computer-related skills for immediate application to other curricular areas.
- **iv.** To facilitate the development and application of problem-solving skills in students.

10. Course Outcomes (COs):

The students will be able to:-

- **i.** Derive mathematical models of physical systems.
- **ii.** Solve differential equations using appropriate methods.
- **iii.** Present mathematical solutions in a concise and informative manner.
- **iv.** Solve linear system of equations by direct, iterative methods and determine eigen values and eigen vectors of given square matrix also inverse of the matrix using Cayley Hamilton theorem.

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the Unit: Matrices**

Matrices, additions and scalar multiplication, matrix multiplication; Linear system of equations, rank of a matrix, determinants, inverse of matrix, Gauss elimination and Gauss Jordan Methods, E-row methods. Caley Himalton theorem, Eigen value & Eigen vector.

Unit – 2	**Number of lectures = 12**	**Title of the Unit: Laplace Transforms& application**

Laplace transform & inverse laplace transform: Solution based on Definition, change of scaleproperty, 1^{st}& 2^{nd} shifting Theorem, LT division by t, LTof the dericative, LT by multiplication by t, Convolution th. And application on LT & Inverse LT.

Unit – 3	**Number of lectures = 10**	**Title of the Unit: Calculus**

Taylor & Maclaurin series for one and two variables (without proof),Partial derivative, Multiple integral: change of order of integration, Double integration in Cartesian & polar form. Triple integration & Beta and Gamma function.

Unit – 4	**Number of lectures = 10**	**Title of the Unit :Differential equation &its application**

Exact differentia equation, Application of DE of first order and first degree to simple electric circuits, Linear differential equation of 2^{nd} and higher order., Method of variation, Cauchy's and Lagrendre's linear equations, Application of linear differential equations to electric circuits.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended:

Text Books

i) N. P. Bali and Manish Goyal, A text book of engineering mathematics, Laxmi publication, 2010

Reference Books

i) H.K.Dass, A text book of engineering mathematics, S.Chand& Company LTD

ii) B.S.Grewal, A text book of engineering mathematics, Khanna publication.

iii) Elements of Engineering Mathematics, Liu, Tata Mac Graw Hills.

iv) Kolman B, Busby R.C. and Ross S., Engineering Mathematical Structures for Computer Science, Fifth Edition, Prentice Hall of India, New Delhi, 2006.

1. Name of the Department- Mechanical Engineering						
2. Course Name	**Design Thinking**	**L**	**T**		**P**	
3. Course Code		**3**	**0**		**0**	
4. Type of Course (use tick mark)		**Core ()**	**PE ()**	**BSC ()**	**OE ()**	**EAS (✓)**
5. Pre-requisite (if any)	**NA**	**6. Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 42		**Tutorials = 0**	**Practical = 0**			

8. Course Description

Design thinking is a systematic method of solving problems. This method is unique that it starts and ends with humans. The design thinkers start by observing, interviewing or just plain experiencing a situation. Then, they proceed to improve the situation of the humans by solving problems for them. This course familiarizes you with the concept of "innovation" and the journey of a design idea from the identification of a problem to a final solution that has a positive impact on a large community of users.

9. LearningObjectives:

i) To expose the student with state-of-the-art perspectives, ideas, concepts, and solutions related to the design and execution of innovation driven projects using design thinking principles.

ii) To develop an advance innovation and growth mindset form of problem identification and reframing, foresight, hindsight and insight generation.

iii) To prepare the mindset and discipline of systemic inspiration driven by an educated curiosity aimed find new sources of ideas, new connections and new models specially outside their regular operating atmosphere.

iv) To propose a concrete, feasible, viable and relevant innovation project/challenge.

10. Course Outcomes (COs): The students will be able to: -

i) Understand the concepts of design thinking approaches.

ii) Create design thinking teams and conduct design thinking sessions.

iii) Apply both critical thinking and design thinking in parallel to solve problems.

iv) Apply some design thinking concepts to their daily work.

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the unit: Introduction to Design Thinking**

What Is Design Thinking? Preparing Your Mind for Innovation, Empathize Phase: Customer Journey Mapping, Analyze Phase: 5-Whys and How might we..., Idea Generation, Free Brainstorming & Make/Test Phase: Prototype, Experimentation.

Unit – 2	**Number of lectures = 10**	**Title of the unit: Innovation by Design**

The Seven Concerns, Design Thinking and Collaboration, Challenges to Innovation, Understanding Users, Arriving at Design Insights, Prototyping for User Feedback, The First C: The Cause, Crossing the first Pitfall, Trial and Error, User Feedback for Development, New users, New needs to meet, Knowing the Context.

Unit – 3	**Number of lectures = 11**	**Title of the unit: Context, Comprehension, Check and Cause**

The Second C: The Context, The Basic Need, Ingenious Attempt, Further Insights, The Working Rig, Concepts Generation, Experiencing the Product, Refinements.

The Third C: The Comprehension, Understanding Constraints, Positioning the Product, Exploring Possibilities, More Experiment, Understanding the Technology, At the 2nd Valley of Death, Finishing Touches.

The Fourth C: The Check and Cause, the product, the Users and the Context, The Prototyping, User Needs, The Crucial Step Missed.

Unit – 4	Number of lectures = 11	Title of the unit: Conception, Crafting and Connection

The Fifth C: The Conception, Synchronic Studies, One Product, many problems, Concept Clusters, From Idea to Product, Prototyping, Material and Technologies, Collaborative Efforts.
The Sixth C: The Crafting, Recap, The Manufacturing Challenge, The User Feedback, The Iterative Process.
The Seventh C: The Connection, The Seed for Innovation, Pinnacle for Innovation, The Innovation Timeline, The Innovation Champions, The Innovation Domain, The Innovation Template, The Serial Innovation.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Book

i) Innovation By Design by Chakravarthy, BattulaKalyana, and JanakiKrishnamoorthy, Springer India, 2013, ISBN 978-81-322-0901-0

Reference Books

i) Innovation by Design: How Any Organization Can Leverage Design Thinking to Produce Change, Drive New Ideas, and Deliver Meaningful Solutions by Thomas Lockwood, New Page Books, US; 1st edition (28 November 2017), ISBN: 1632651165.

ii) Innovation by Design by Gerard Gaynor, Amacom, A Division of American Management Associ135 West 50th Street New York, NY, United States, ISBN:978-0-8144-0696-0

1. Name of the Department- Electrical and Electronics Engineering							
2. Course Name	**Electronic Devices**	**L**		**T**		**P**	
3. Course Code		3		0		0	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**PE ()**
5. Pre-requisite (if any)	**Basic Business Studies knowledge**	**6. Frequency (use tick marks)**		Even ()	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		**Tutorials = 0**		**Practical= 0**			

8. Brief Syllabus: As a student in the course, you will study the various sub-fields of the discipline including digital and analog electronics, electrical power generation, transmission, distribution and utilization, power system engineering, electrical machines and drives, control systems, signal processing and power electronics.

9. Learning objectives:

The objective of the course is to

- **i)** To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode,
- **ii)** To demonstrate the Bipolar and Field effect Transistors,
- **iii)** To study Power control devices,
- **iv)** To study the LED, LCD and other Opto-electronic devices

10. Course Outcomes (COs):

Upon completion of this course, graduates will be able to:

- **i)** Understand the V-I characteristic of diode, UJT and SCR
- **ii)** Information about the equivalence circuits of transistors
- **iii)** Operate the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors,
- **iv)** Analysis the Power control devices, LED, LCD and other Opto-electronic devices

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the unit:** PN Junction:

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

Unit – 2	**Number of lectures = 12**	**Title of the unit:** Bipolar Junction Transistor(BJT)

PNP and NPN transistors, current components in BJT, BJT static characteristics (Input and Output) , Early effect , CB , CC , CE configurations of transistor and bias conditions (cut off, active, and saturation regions), CE configuration as two port network, h – parameter model and its equivalent circuit. Determination of h – parameters from the characteristics. Load line analysis (AC and DC). Transistor Biasing – Fixed and self bias.

Unit - 3	**Number of lectures = 10**	**Title of the unit:** Field Effect Transistor (FET)& Uni Junction Transistor (UJT):

Construction and working of JFET, output and transfer characteristics of FET, Determination of FET parameters. Application of FET as Voltage variable resistor. Advantages of FET over BJT. MOSFET :: construction and working of enhancement and depletion modes , output and transfer characteristics Application of MOSFET as a switch . Construction and working of UJT and its Characteristics. Application of UJT as a relaxation oscillator.

Unit - 4	**Number of lectures = 10**	**Title of the unit:** Silicon Controlled Rectifier (SCR) & Photo electronic Devices:

Construction and working of SCR. Two transistor representation, Characteristics of SCR. Application of SCR for power control. : Construction and Characteristics of Light Dependent Resistor (LDR), Photo voltaic Cell, Photo diode, Photo transistor and Light Emitting Diode(LED).

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Books

i) Electronic Devices and circuits-Millman and Halkias,(TMH)

Reference Books:

i) Principles of Electronics-V.K.Mehta & Rohit Mehta
ii) Electronic Devices and Circuits-Allen Moltershed(PHI)
iii) Basic Electronics and Linear Circuits-Bharghava U
iv) Electronic Devices and Circuits-Y.N.Bapat
v) Electronic Devices and Circuits-Mithal.
vi) 7) Experiments in Electronics-S.V.Subramanyam.

1. Name of the Department- Electrical and Electronics Engineering								
2. Course Name	**Electronic Device Lab**		**L**	**T**		**P**		
3. Course Code			0	**0**		**2**		
4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**		**PE ()**		
5. Pre-requisite (if any)	NA		**6. Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()	

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials = 0**	**Practical = 28**

8. Course Description

Course introduces to Electronic Device lab; students will learn to use various sub-fields of the discipline including digital and analog electronics, electrical power generation, transmission, distribution and utilization, power system engineering, electrical machines and drives, control systems, signal processing and power electronics.

10. Learning Objectives:

- **i)** To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode,
- **ii)** To demonstrate the Bipolar and Field effect Transistors,
- **iii)** To study Power control devices,
- **iv)** To study the LED, LCD and other Opto-electronic devices

10. Course Outcomes (COs): On completion of this course, the students will be able to:

- **i)** Understand the V-I characteristic of diode, UJT and SCR
- **ii)** Information about the equivalence circuits of transistors
- **iii)** Operate the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors,
- **iv)** Analysis the Power control devices, LED, LCD and other Opto-electronic devices

11. S.No	**List of Experiment**	**CO covered**
1.	To draw volt- ampere characteristics of Junction diode and determine the cut – in voltage, forward and reverse resistances.	**i**
2.	Zener diode V – I Characteristics – Determination of Zener breakdown voltage.	**iii**
3.	Voltage regulator (line and load) using Zener diode.	**iii**
4.	BJT input and output characteristics (CE configuration) and determination of 'h' parameters.	**iii**
5.	FET – Characteristics and determination of FET parameters.	**iii**
6.	UJT characteristics – determination of intrinsic standoff ratio.	**ii**
7.	UJT as relaxation oscillator.	**ii**
8.	Characteristics of LDR/Photo diode/Photo transistor/Solar cell.	**iv**
9.	Characteristics of Photo diode	**iv**
10.	Characteristics of Solar cell.	**iv**

1. **Name of the Department** : Electrical and Electronics Engineering

2.Course Name	Analog and Digital Communication	L	T	P
3.Course Code		3	0	0

4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**OE ()**
5. Pre-requisite (if any)	Analog and Digital Electronics	**6. Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 42	Tutorials = 00	Practical = 00

8. Brief Syllabus: In analog communication analog signal is used for information transmission. Analog communication uses analog signal whose amplitude varies continuously with time from 0 to 100. Digital communication uses digital signal whose amplitude is of two levels either Low i.e., 0 or either High i.e., 1.

9. Learning objectives:

i) To give a comprehensive exposure to all types of amplifiers constructed with discrete components such as BJTs and FETs.

ii) To give a comprehensive exposure to all types of oscillators constructed with discrete components such as BJTs and FETs.

iii) To develop a strong basis for building linear circuits.

iv) To develop a strong basis for digital integrated circuits.

10. **Course Outcomes:** On completion of this course, the students will be able to

Upon completion of this course, students will be able to

i) Understand different blocks in communication system and how noise affects communication using different parameters.

ii) Distinguish between different amplitude modulation schemes with their advantages, disadvantages and applications.

iii) Analyze generation and detection of FM signal and comparison between amplitude and angle modulation schemes.

iv) Describe and determine the performance of line codes and methods to mitigate inter symbol interference

v) recognize different layers of OSI used in systems and networking, choose different modulation techniques and select the right method of error detection and error correction for data transmission.

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the unit: Introduction to communication systems**

Introduction to communication systems: Communication, communication systems, Modulation, bandwidth requirement, Noise: External noise, internal noise, Noise calculations, noise figure, noise temperature

Unit - 2	**Number of lectures = 12**	**Title of the unit: Amplitude Modulation**

Amplitude Modulation: Amplitude modulation theory – Frequency spectrum of AM wave, representation of AM wave, Power relation in the AM wave, Frequency and Phase Modulation: Theory of Frequency and Phase Modulation: Description of the systems, mathematical representation of FM, Frequency spectrum of

FM wave, Phase modulation, Intersystem comparison, Noise and FM: Effect of noise on carrier, pre-emphasis and de-emphasis, other form of interference, comparison of wide band and narrow band FM

Unit - 3	**Number of lectures = 10**	**Title of the unit: Modulation for Digital Signal**

Modulation for Digital Signal: ASK, FSK, and PSK: Introduction, modulation and demodulation circuits and waveforms Pulse Modulation: Types, PWM, Introduction to Data And Network Communication: Introduction, Data Communication System, Data Communication Links: Character Codes, Digital Data Rates, Serial Data Formats, Encoded Data Formats, Error Detection & Correction: Introduction, Asynchronous Data Method, Synchronous Data Error Methods, Error Testing Equipment

Unit 4	**Number of lectures = 10**	**Open System Network Models**

Open System Network Models: Introduction, Data Topologies, Data Switching, Types Of Networks, The Open System Interconnection (OSI) Architecture, System Network Architecture (SNA), SNA Operating Sessions, Higher Capacity Data Communication: Introduction, Multiplexing Methods, Sampling Theorem, Quantization, Pulse Code Modulation, Delta Modulation, Digital T Carriers, Companding, Codecs, Fiber Optic Communication: Introduction, Basic Concepts of Light Propagation, Fiber Cables, Light Sources, Optical Detectors, Fiber-Cable Losses,

12. **Brief Description of self learning / E-learning component**: The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

Books Recommended

13. Text Books :

i) Haykin Simon, "Communication Systems", 4th Edition, Wiley publication.

Reference Books:

i) Communication Systems: Analog and Digital by R. P. Singh and B. D. Sapre, Tata-McGraw Hill

ii) Modern Digital and Analog Communication Systems (4th Edition) by B. P. Lathi and Zhi Ding, Oxford University Press

iii) Electronic Communication Systems by Keddedy and Davis, Tata Mc-Graw Hill Publication

iv) Introduction to Data and Network Communications by Michael A. Miller, Cengage Learning

1. Name of the Department : Electrical and Electronics Engineering							
2.Course Name	Analog and digital communication lab	L		T		P	
3. Course Code		0		0		2	
4. Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**		**PE ()**	
5. Pre-requisite (if any)	NA	**6. Frequency (use tick marks)**		Even (√)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 0		**Tutorials =** 00		**Practical =** 28			

8. Brief Syllabus

In analog communication analog signal is used for information transmission. Analog communication uses analog signal whose amplitude varies continuously with time from 0 to 100. Digital communication uses digital signal whose amplitude is of two levels either Low i.e., 0 or either High i.e., 1.

9. Learning objectives:

i) To give a comprehensive exposure to all types of amplifiers constructed with discrete components such as BJTs and FETs.

ii) To give a comprehensive exposure to all types of oscillators constructed with discrete components such as BJTs and FETs.

iii) To develop a strong basis for building linear circuits.

iv) To develop a strong basis for digital integrated circuits.

10. **Course Outcomes**: On completion of this course, the students will be able to

i) Understand different blocks in communication system and how noise affects communication using different parameters.

ii) Distinguish between different amplitude modulation schemes with their advantages, disadvantages and applications.

iii) Analyze generation and detection of FM signal and comparison between amplitude and angle modulation schemes.

iv) Recognize different layers of OSI used in systems and networking, choose different modulation techniques and select the right method of error detection and error correction for data transmission

11 .Sr. No.	**List of Experiments**	**CO covered**
1	To study Amplitude Modulation and Demodulation.	ii
2	To study Frequency Modulation and Demodulation.	iii
3	To Study and observe the performance of different types of line codes.	iv
4	To Study and Perform sampling theorem and reconstruction.	iii
5	. To perform TDM-PCM Transmission and Reception.	i

6	To study Delta Modulation.	iii
7	To study and observe the performance of An-adaptive Delta modulator/De-modulator circuits	iii
8	Study and observe the performance of Digital carrier system—ASK.	iii
9	To Study and observe the performance of Digital carrier system—FSK.	iii
10	To Study and observe the performance of Digital carrier system—PSK.	iii
11.	To study and perform PAM, PWM, PPM.	i

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

1. **Name of the Department** : Electrical & Electronics Engineering

2. Course Name	**Analog electronic circuits**	**L**	**T**		**P**	
3. Course Code		3	0		0	
4. **Type of Course (use tick mark**)		**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**OE ()**
5. Pre-requisite (if any)	Analog and Digital Electronics	**6. Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 42	**Tutorials = 00**	**Practical = 00**

8. **Brief Syllabus:** Obtain the output characteristics of clipper and clamper circuits. Design and compare biasing circuits for transistor amplifiers & explain the transistor switching. Design and analyze the power amplifier circuits and oscillators for different frequencies. Design and analysis of FET and MOSFET amplifiers.

9. **Learning objectives**:
   - **i)** To give a comprehensive exposure to all types of amplifiers constructed with discrete components such as BJTs and FETs.
   - **ii)** To give a comprehensive exposure to all types of oscillators constructed with discrete components such as BJTs and FETs.
   - **iii)** To develop a strong basis for building linear integrated circuits.
   - **iv)** To develop a strong basis for building digital integrated circuits.

10. **Course Outcomes:** Upon completion of the course, the student will be able to
   - **i)** Understand the working of different types of amplifier, oscillator and multivibrator circuits.
   - **ii)** Design BJT and FET amplifier and oscillator circuits.
   - **iii)** Analyze transistorized amplifier and oscillator circuits.
   - **iv)** Understand the applications of different types of amplifier, oscillator, attenuators and multivibrator circuits.

11. Unit wise detailed content

Unit-1	**Number of lectures = 12**	**Title of the unit: Introduction to communication systems**

Small signal amplifiers - biasing circuits of BJT and FET transistors, analysis and design of BJT and FET amplifiers, chopper stabilized amplifiers, case studies – application of current amplifiers in SCR firing circuits and power supplies.

Unit - 2	**Number of lectures = 10**	**Title of the unit: Amplitude Modulation**

Large signal amplifiers – analysis and design of class A and class B power amplifiers, class C and class D amplifiers, thermal considerations, tuned amplifiers.

Unit - 3	**Number of lectures = 10**	**Title of the unit: Modulation for Digital Signal**

Feedback amplifiers – gain with feedback – effect of feedback on gain stability, distortion, bandwidth, input and output impedances; topologies of feedback amplifiers, case studies – application of negative feedback in dc-dc converters.

Unit 4	Number of lectures = 10	Title of the unit : Open System Network Models

Oscillators – Barkhausen criterion for oscillation – Hartley & Colpitt's oscillators – phase shift, Wien bridge and crystal oscillators - Clapp oscillator – oscillator amplitude stabilization.
Pulse circuits – attenuators – RC integrator and differentiator circuits – diode clampers and clippers – multivibrators - Schmitt Trigger- UJT Oscillator, case studies – application of UJT oscillator in SCR firing circuits and opto-electronic control circuits.

12. Brief Description of self learning / E-learning component:

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org Journal papers; Patents in the respective field.

13. Books Recommended:

Text Books:

Jacob Millman, 'Microelectronics', McGraw Hill, 2nd Edition, Reprinted, 2009.

Reference Books:

i) David A Bell, 'Fundamentals of Electronic Devices and Circuits', Oxford University Press, Incorporated, 2009.
ii) Allen Mottershead, 'Electronic Devices and Circuits-An Introduction', PHI, 18th Reprint, 2006.
iii) Thomas L. Floyd, David M. Buchla, 'Electronics Fundamentals', Pearson Prentice Hall, 7th Edition, 2010**.**
iv) Robert.L.Boylestad, 'Electronic Devices and Circuit Theory', Pearson, 10th Edition, 2009.
v) Sedra Smith, 'Microelectronic Circuits', Oxford University Press, 6th Edition, 2010.
vi) Jacob Millman and Christos C. Halkias, 'Integrated Electronics: Analog and Digital Circuits and Systems', 2nd Edition, Tata McGraw Hill Education, 2011.

1. **Name of the Department** : Electrical and Electronics Engineering					
2.Course Name	**Analog Electronics Lab**	L	T	P	
3. Course Code		0	0	2	
4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

5. Pre-requisite (if any)	NA	**6. Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials =** 00	**Practical =** 28

8. Brief Syllabus

In this subject working of various amplifiers is explained. Students learn how BJT work at low and high frequencies, what happens in FET amplifiers, Power amplifiers and feedback amplifiers, different types of oscillators and their working, studying of various types of tuned amplifiers.

9. Learning objectives:

i) To learn different biasing techniques and
ii) To learn the behavior of BJT, FET at low and high frequencies.
iii) To attain expertise in lab equipment handling and understanding the basic devices.
iv) To learn their properties, characteristics in detail. Along with their practical usage in the circuit.

10. **Course Outcomes**: On completion of this course, the students will be able to

i) To Design of various analog circuits to compare.
ii) To construct various analog circuits.
iii) To take measurement of various analog circuits to compare .
iv) Experimental results in the laboratory with theoretical analysis

11 .Sr. No.	**List of Experiments**	**CO covered**
1	Study of lab equipments and components: CRO, Multimeter, Function Generator, Power supply, Active, Passive Components & Bread Board.	i
2	P-N Junction Diode: Characteristics of PN Junction diode-Static and dynamic resistance measurement from graph.	ii
3	Applications of PN junction diode: Half & Full wave rectifier-Measurement of Vrms, Vdc, and ripple factor-use of filter- ripple reduction (RC Filter)-Clipper & Clamper	iii
4	Properties of junctions Zener diode characteristics. Heavy doping alters the reverse characteristics. Graphical measurement of forward and reverse resistance.	iii
5	Application of Zener diode: Zener diode as voltage regulator.	iii

	Measurement of percentage regulation by varying load resistor.	
6	Characteristic of BJT: BJT in CB and CE configuration- Graphical measurement of h parameters from input and output characteristics.	iv
7	Characteristic of FET: FET in common source configuration. Graphical measurement of its parameters Gm & Rd from input and output characteristics.	iii
8	Characteristic of silicon-controlled rectifier.	iii
9	To plot V-I Characteristics of DIAC .	i
10	To draw V-I characteristics of TRIAC for different values of Gate Currents.	i
11.	Study of frequency response of active filters LP, HP & BP	ii

1. Name of the Department- Electrical & Electronics Engineering							
2. Course Name	**Workshop Technology Lab**	**L**		**T**		**P**	
3. Course Code		**0**		**0**		**2**	
4. Type of Course (use tick mark)		**Core ()**	**EAS (✔)**	**PE ()**		**OE ()**	
5. Pre-requisite (if any)		**6. Frequency (use tick marks)**		Even (√)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 0		**Tutorials = 0**		**Practical = 28**			
8. Course Description							

Workshop technology deals with different processes by which component of a machine or equipment's are made. The subject aims at imparting knowledge and skill components in the field of basic workshop technology. It deals with different hand and machine tools required for manufacturing simple metal components and articles.

9. Learning objectives:

i. As the need of hand on practice for the engineers this course has special weightage.

ii. To be industry ready a student must have the knowledge of various welding processes, should have knowledge about the foundry and various machine tools. So this course fulfills all these needs.

10. Course Outcomes (COs): After the completion of the course, the student shall be able to

i.	Practice workshop safety rules effectively.
ii.	Acquire knowledge and use simple measuring and gauging instruments.
iii.	Acquire knowledge and use simple hand tools
iv.	Operate simple drilling machines for producing small holes
v.	Operate various machine tools for producing simple metal components and articles
vi.	Acquire knowledge and practice on foundry, forging, joints and welding

11. Lab Component

Sr. No.	**Title**	**CO covered**
1	To perform machining operations like turning, step turning, threading etc. on the Lathe.	v
2	To make slot on work piece by using Milling Machine.	iv
3	To prepare groves on work piece by using Shaper Machine.	v
4	To perform surface finishing operation on Surface Grinder.	iv, v
5	To perform drilling operations.	iv
6	To make cross lap joint.	iii, iv

7	To make butt joint	i, ii, vi
8	To make Lap joint by using Electric Arc Welding.	i, ii, vi
9	To make butt joint by using Electric Arc Welding	i, ii, vi
10	To practice fitting operations.	ii, iii, vi
11	To make male and female joint.	ii, iii, vi
12	To prepare open box tray.	ii, iii, vi

1. Name of the Department- Electrical & Electronics Engineering							
2. Course Name	**Engineering Graphics and Design Lab**	**L**		**T**		**P**	
3. Course Code		0		0		2	
4. Type of Course (use tick mark)		**Core ()**	**EAS (✔)**	**PE ()**		**OE ()**	
5. Pre-requisite (if any)	**Geometry and Drawing at +2 Level**	**6. Frequency (use tick marks)**		Even (√)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures =0		**Tutorials = 0**		**Practical = 28**			
8. Course Description							

Engineering Graphics and design is considered as language of engineers. This course is introduced to provide basic understanding of importance of designing aspects in engineering applications. The topics are covered in a sequence and starts from the basic concepts of introduction to computer aided design and then designing of planes and solids. Towards the end of the course, it is expected that students would be matured to visualize the engineering components from any drawing sheet, followed by the projection techniques. A number of chosen problems will be solved to illustrate the concepts clearly.

9. Learning objectives:

i) To understand the basic concepts of Graphics.
ii) To develop the skills of reading & interpretation of Engineering Drawing.
iii) To construct the basic and intermediate geometry.
iv) To develop the skills of preparing the engineering drawing.

10. Course Outcomes (COs):

i) Understand the use of drawing instruments and dimensioning of given drawing.
ii) Acquire the visualization skills and use of projection methods.
iii) Able to draw the different views using projection of lines, planes and solids.
iv) Use of edges, vertices and curves to construct the drawing.

11. Lab component

Sr. No.	**Title**	**CO Covered**
1	Different types of lines with illustration and application.	I, II
2	Use of Drawing instruments and understand the design sheet layout with dimensioning and lettering.	I
3	Applications of drawing commands in AutoCAD.	I
4	Projection of points in all the four quadrants.	II
5	Projection of straight lines parallel, perpendicular, inclined to projection	II, III

	planes and traces of lines.	
6	Projection of plane in perpendicular and inclined positions.	III
7	Projection of cones and solid cylinders with axes parallel, perpendicular and inclined to both the reference planes.	III, IV
8	Projection of prisms and pyramids with axes parallel, perpendicular, inclined to both the reference planes.	III, IV
10	Design Orthographic projection of simple machine elements and engineering drawings.	IV
11	Design Isometric projection of simple machine elements and engineering drawings.	IV
12	Design Sectional views of simple machine elements and engineering drawings.	IV

Semester III

1. Name of the Department: Electrical and Electronics Engineering						
2. Course Name	Microprocessor & Microcontroller		L	T	P	
3. Course Code			3	0	0	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**OE ()**
5. Pre-requisite (if any)	Digital Logic Design	**6. Frequency (use tick marks)**	Even ( )	Odd (√)	Either Sem ( )	Every Sem ( )
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 42		**Tutorials = 0**	**Practical = 00**			

8. Brief Syllabus

Microprocessor and microcontrollers are the most useful electronic chips which are used to design and develop processor and computer based automatic smart electronics systems for home and industry application. Students learn CPU architecture, memory interfaces and management, coprocessor interfaces, bus concepts, bus arbitration techniques, interfacing of systems using AD/DA, serial I/O devices, DMA, interrupt control devices, including design, construction, and testing of dedicated microprocessor systems (static and real-time). Upon completion, students should be able to design, construct, program, verify, analyze, and troubleshoot fundamental microprocessor interface and control circuits using related equipment.

9. Learning objectives:

i. To gain an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques with peripheral devices
ii. To learn the concept of designing computer organization and architecture
iii. To gain an understanding of applications of microprocessors in designing processor-based automated electronics system.

10. Course Outcomes: On completion of this course, the students will be able to

i. Explain the internal organization and operation of microprocessors/microcontrollers.
ii. Program 8086 Microprocessor, 8051 and PIC Microcontrollers for application specific solution
iii. Design microprocessors/microcontrollers-based systems

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the Unit: Introduction**

Inoduction to Microprocessors, Microcontrollers and system design – Assembly and High-Level language programming–System Development Environment: assembler, compiler & IDE

Unit - 2	**Number of lectures = 12**	**Title of the Unit: 8086 Microprocessor**

Architecture and Programming of 8086 microprocessor: pipelining, Instruction sets, addressing modes – Memory addressing, decoding and Memory interfacing – Interrupts and interrupts handling.

Unit - 3	**Number of lectures =10**	**Title of the Unit: I/O and Bus Interfacing**

Interfacing methods – 8255 PPI interface, 8254 timer interface, 8259 PIC and DMA controller interface – Bus Interface: electrical characteristics, interfacing ISA bus, EISA, PCI bus, LPT, USB and RS232 interface.

Unit - 4	Number of lectures = 10	8051 Microcontroller
Introduction to single chip Microcontrollers, Intel MCS-51 family features –8051/8031-architecture – 8051 assembly language programming, addressing modes – Programming interrupts, timers and serial communication – system design with 8051. Application of microprocessor and Microcontrollers in data acquisition systems, process control, signal processing.		
12. Books Recommended :		
Text Book: i) Barry B Brey, The intel microprocessor: architecture, programming and interfacing, PHI **Reference Book:** i) Mohammad Ali Mazidi and Janice Gillispie Maszidi "The 8051 Microcontroller and Embedded Systems" Pearson education, 2003, ISBN- 9788131710265, 2nd Edition		

1. **Name of the Department** : Electrical and Electronics Engineering							
2.Course Name	**Microprocessor and Microcontroller Lab**	L		T		P	
3.Course Code		0		0		2	
4. Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**		
5.Pre-requisite (if any)	Digital Design/ Computer Org. & Arch	**6.Frequency (use tick marks)**	Even ()	Odd (√)	Either Sem ()	Every Sem ()	
7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 0		**Tutorials =** 00		**Practical =** 28			

8. Brief Syllabus

The internal structure and operation of microcontrollers will be studied. The design methodology for software and hardware applications will be developed through the labs and design projects. Additional projects for graduate students.

9. Learning objectives:

- **i.** Understanding of the operation of microprocessors
- **ii.** Implementation of the operation of microcontrollers,
- **iii.** Understanding of the operation of machine language programming
- **iv.** Implementation of the operation of interfacing techniques with peripheral devices

10. **Course Outcomes**: On completion of this course, the students will be able to

- **i.** Programming concepts of 8086 Microprocessor, 8051 and PIC Microcontrollers
- **ii.** Design microprocessors/microcontrollers-based application system.
- **iii.** Design microcontrollers-based application systems.
- **iv.** Implement and develop new experiments on microprocessor/microcontroller based systems.

11. Lab Content

Sr. No.	Title	CO covered
1	To Add Two Binary Number Each 2 Bytes Long	i,ii
2	To Find The Maximum Number. In A Given String (16 Bytes Long) and Store It in Location 0510	ii
3	To Sort A String of A No. of Bytes In Descending Order	ii,iii
4	To Multiply An ASCII String Of Eight Numbers By A Single ASCII Digit. The Result Is A String Of Unpacked BCD Digits.	ii
5	To Divide A String Of Unpacked ASCII Digit.	ii
6	A Data String of No. Of bytes (to be specified in CX reg.) Is located From the Starting Address 0500. The Data String Is To Be Converted To Its Equivalent 2's Complement From And The Result Is Be Stored From 0600 Onwards.	iii
7	Interfacing & Programming for LED	iii, iv
8	Interfacing & Programming for LCD	iii

1. Name of the Department- Electrical & Electronics Engineering								
2. Course Name	**Distribution of Electrical system**	**L**		**T**		**P**		
3. Course Code		**3**		**0**		**0**		
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**PE ()**	
5. Pre-requisite (if any)		**6. Frequency (use tick marks)**		Even ()	Odd (✔)	Either Sem ()	Every Sem ()	
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)								
Lectures = 42		**Tutorials = 0**		**Practical = 0**				

8. Course Description

Electric power distribution system planning, design and operations; load characteristics and distribution transformers; design of sub transmission lines and distribution substations; primary and secondary feeder design considerations; distribution system voltage regulation, protection and reliability; distributed generation and smart grid application.

Learning Objectives:

The students will learn and understand

- **i)** To Understand about Electric Power Distribution Systems presents a full range of technology.
- **ii)** To use the application topics with the goal of providing students a fundamental understanding of one of the major functions of the electric power system – distribution.
- **iii)** To learn the planning, design, analysis and operational concepts of the distribution system.
- **iv)** To learn about the concepts about considerations of voltage regulation, protection, and reliability as well as application of distributed generation and smart grid technology.

10. Course Outcomes (COs):

On completion of this course, the students will be able to

- **i)** To plan distribution systems
- **ii)** To model distribution systems
- **iii)** To study distribution systems
- **iv)** To design and associated equipment and devices.

11. Unit wise detailed content

Unit-1	**Number of lectures = 12**	**Title of the Unit : General Concepts**

Introduction to distribution systems, Load modelling and characteristics. Coincidence factor, contribution, factor loss factor – Relationship between the load factor and loss factor. Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

Unit – 2	**Number of lectures = 10**	**Title of the Unit : Distribution Feeders**

Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels,feeder loading; basic design practice of the secondary distribution system.

Unit-3	Number of lectures = 10	Title of the Unit : Substations
Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.		
Unit – 4	**Number of lectures = 10**	**Title of the Unit : System Analysis**
Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines		

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Books

i) "Electric Power Distribution system, Engineering" – by Turan Gonen, Mc Graw-hill Book Company.

Reference Books

i) Electrical Power Distribution and Automation by S.Sivanagaraju, V.Sankar, DhanpatRai & Co, 2006

ii) Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.

iii) Electric Power Distribution – by A.S. Pabla, Tata Mc Graw-hill Publishing company, 4th edition, 1997.

1. **Name of the Department** : Electrical and Electronics Engineering				
2.Course Name	**Distribution of Electrical system lab**	L	T	P
3.Course Code		0	0	2

4. Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

5.Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even ()	Odd (√)	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials =** 00	**Practical =** 28

8. Brief Syllabus

Electric power distribution system planning, design and operations; load characteristics and distribution transformers; design of sub transmission lines and distribution substations; primary and secondary fder design considerations; distribution system voltage regulation, protection and reliability; distributed generation and smart grid application.

9. Learning objectives:

i. Electric Power Distribution Systems presents a full range of technology and application topics with the goal of providing students a fundamental understanding of one of the major functions of the electric power system – distribution.

ii. Students will learn the planning, design, analysis and operational concepts of the distribution system.

iii. Students will learn the including considerations of voltage regulation, protection, and reliability.

iv. Students will learn the application of distributed generation and smart grid technology.

10. **Course Outcomes**: On completion of this course, the students will be able to

i. To plan distribution systems

ii. To model distribution systems

iii. To study distribution systems

iv. To design and associated equipment and devices.

12. Lab Content

Sr. No.	**Title**	**CO covered**
1	Characteristics of IDMT Over Current Relay.	i,ii
2	Differential protection of 1-Φ transformer.	ii
3	Testing of CT, PT's and Insulator strings.	ii,iv
4	Finding the sequence impedances of 3-Φ synchronous machines.	ii,iv
5	Finding the sequence impedances of 3-Φ Transformer.	iii
6	Load Flow Analysis using Gauss Seidal (GS) Method.	iv

7	Load Flow Analysis using Fast Decoupled (FD) Method.	ii,iv
8	LG, LL and 3-Φ fault analysis of 3-Φ synchronous machines.	ii
9	Power circle diagrams of a 3-Φ transmission line model.	i
10	ABCD constants and Regulation of a 3-Φ transmission line model.	ii
11	Transient Stability Analysis for Single Machine connected to Infinite Bus by Point by Point method.	ii,iii

1. Name of the Department- Electrical & Electronics Engineering							
2. Course Name	**Network Analysis And Synthesis**	**L**		**T**		**P**	
3. Course Code		**3**		**0**		**0**	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**OE ()**
5. Pre-requisite (if any)	**Basic Electrical and Electronics Engineering**	**6. Frequency (use tick marks)**		Even ()	Odd (✔)	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)		
Lectures = 42	**Tutorials = 0**	**Practical = 0**

8. Course Description

Network Analysis and Synthesis is a field of engineering that deals with the study and applications of Graph theory, two port parameters and network synthesis, and also deals with the design and application of active and passive filters. Graph theory is considered to deal with the problems associated with large-scale electrical systems such as power transmission and distribution system. This course lay foundation for the students to study other subjects related to both the engineering streams.

9. Learning Objectives:

The students will learn and understand

- **i.** To learn the concepts of network analysis in electrical and electronics engineering.
- **ii.** To learn linear circuit analysis, graph theory and
- **iii.** To learn about different network theorems.
- **iv.** Analyze two port networks using Z, Y, ABCD and h parameters

10. Course Outcomes (COs):

On completion of this course, the students will be able to

- **i.** Analyze an electric network using graph theory and different network theorems e.g. Thevenin's theorem, superposition theorem, Nodal voltage etc. and power system transmission line using ABCD parameters.
- **ii.** Synthesize an electric network using driving point functions
- **iii.** Design active and passive filter circuits
- **iv.** Explain the electrical network theories and verify them through experiments

11. Unit wise detailed content

Unit-1	**Number of lectures = 12**	**Title of the Unit: Graph Theory & Network Theorems**

Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Nodal methods of analysis.

Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem

Unit – 2	**Number of lectures = 10**	**Title of the Unit: Network Functions and Transient analysis**

Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot, transient analysis of ac & dc systems.

Unit – 3	Number of lectures = 10	Title of the Unit: Two Port Networks
Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Interrelationships between the parameters, inter-connections of two port networks, T & Đ Representation.		
Unit – 4	**Number of lectures = 10**	**Network Synthesis & Filters**
Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms. Image parameters and characteristics impedance, passive and active filter fundamentals, low pass, high pass, (constant K type) filters, and introduction to active filters.		

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Books

i) Circuit Theory - Analysis and Synthesis by Abhijit Chakrabarti

13. Reference Books

i) Electrical Circuit Theory by B.L.Theraja, M.E.Van.Valkenburg

ii) Fundamentals of Electric Circuits by Charles K. Alexander, Matthew N.O. Sadiku

iii) Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Steven M. Durbin

1. **Name of the Department** : Electrical and Electronics Engineering

2.Course Name	Network Analysis & Synthesis Lab	L	T	P
3.Course Code		0	0	2

4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

5.Pre-requisite (if any)	**Basic Electrical and Electronics Engineering**	**6.Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()

7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials =** 00	**Practical =** 28

8. Brief Syllabus

Network Analysis and Synthesis Lab is a field of engineering that deals with the study and applications of Graph theory, two port parameters and network synthesis, and also deals with the design and application of active and passive filters. Graph theory is considered to deal with the problems associated with large-scale electrical systems such as power transmission and distribution systems. This course lay foundation for the students to study other subjects related to both the engineering streams.

9. Learning objectives:

i) To learn the concepts of network analysis in electrical and electronics engineering.
ii) To learn linear circuit analysis, graph theory and
iii) To learn about different network theorems.
iv) Analyze two port networks using Z, Y, ABCD and h parameters

10. **Course Outcomes**: On completion of this course, the students will be able to

i) Analyze an electric network using graph theory and different network theorems e.g. Thevenin's theorem, superposition theorem, Nodal voltage etc. and power system transmission line using ABCD parameters.
ii) Synthesize an electric network using driving point functions
iii) Design active and passive filter circuits
iv) Explain the electrical network theories and verify them through experiments

11. Lab Content

Sr. No.	Title	CO covered
1	To verify Thevenin's theorem in a.c.	i,ii
2	To verify Norton's theorem in a.c.	ii
3	To verify the Superposition theorem in a.c.	ii,iv
4	To verify the Maximum Power Transfer Theorem.	ii
5	Determination of Z-parameters of a two-port network.	iii
6	To verify and determine Y-parameters of a parallel connected two-port network.	iii
7	Determination of H-parameters of a two-port network.	iv
8	To verify and determine ABCD-parameters of a cascade interconnected	iv

	two-port network.	
9	Determination of characteristics impedance of a symmetrical T-network using S/C and O/C test.	iv
10	To determine equivalent parameter of parallel connections of two port network and study loading Effect.	ii
11	Transient Stability Analysis for Single Machine connected to Infinite Bus by Point by Point method.	iv

Semester IV

1. Name of the Department: Electrical and Electronics Engineering							
2. Course Name	Measurements and Instrumentation		**L**	**T**		**P**	
3. Course Code			3	0		0	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**PE ()**
5. Pre-requisite (if any)	Basic Electrical and Electronics Engineering	**6. Frequency (use tick marks)**		Even (√)	Odd ()	Either Sem ()	Every Sem ()

7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 42	**Tutorials = 00**	**Practical = 00**

8. Brief Syllabus

This course deals with the basics of Electrical and Electronic measuring instruments used in laboratory and industry. In the process they learn different type of instruments like PMMC, Moving Iron, Electrodynamometer which includes voltmeter, ammeter, wattmeter, energy meter, power factor meter, frequency meter, Q meter, etc. Students will also learn about different AC and DC bridges to obtain various electrical parameters.

9. Learning objectives:

- **i)** To know the necessity of different measuring instruments and their design principle.
- **ii)** To understand the working principle of different measuring instruments and technical solutions to handle different errors.
- **iii)** To learn the architecture of advanced measuring instrument.
- **iv)** To learn working principle of advanced measuring instrument and their applications.

10. **Course Outcomes**: On completion of this course, the students will be able to:

- **i)** Learn units, dimensions, standards and errors and basics of different types of measuring instruments to measure different electrical quantities.
- **ii)** To learn about and basics of different types of measuring instruments.
- **iii)** Apply their knowledge to measure electrical quantities using standard analog
- **iv)** Apply their knowledge to measure electrical quantities using standard digital measuring instruments.

11. Unit wise detailed content

Unit-1	**Number of lectures = 12**	**Title of the Unit: Philosophy of Measurement & Analog Measurement of Electrical Quantities**

Unit & dimensions, standards, Errors, Characteristics of Instruments and measurement system, basics of statistical analysis. PMMC instrument, DC ammeter, DC voltmeter, Ohm meter, Moving Iron instrument, Electrodynamics Wattmeter, errors and remedies, Three Phase Wattmeter, Power in three phase system, Energy meter

Unit - 2	**Number of lectures = 10**	**Title of the Unit :Measurement: Instrument Transformer**

Instrument Transformer and their applications in the extension of instrument range, Introduction to measurement of speed, frequency and power factor.

Unit - 3	**Number of lectures = 10**	**Measurement of Parameters**

Different methods of measuring low, medium and high resistances, measurement of inductance &

capacitance with the help of AC Bridges- Wheatstone, Kelvin, Maxwell, Hay's, Anderson, Owen, Heaviside, Campbell, Schering, Wien bridges, Wagner Earthling device, Q Meter.

Unit - 4	**Number of lectures = 10**	**AC Potentiometer & Magnetic Measurement**

Polar type & Co-ordinate type AC potentiometers, application of AC Potentiometers in electrical measurement. Ballistic Galvanometer, Flux meter.

12. Brief Description of self learning / E-learning component:

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended:

Text book:

i) A.K. Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons

Referenec books:

ii) E.W. Golding & F.C. Widdis, "Electrical Measurement &Measuring Instrument", A.W.Wheeler & Co. Pvt. Ltd. India.

iii) Forest K. Harries, "Electrical Measurement", Willey Eastern Pvt. Ltd. India

1. **Name of the Department** : Electrical and Electronics Engineering						
2.Course Name	**Measurements & Instrumentation Lab**	L	T	P		
3.Course Code		0	0	2		
4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**	
5.Pre-requisite (if any)	**Basic Electrical and Electronics Engineering**	**6.Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()
7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		**Tutorials =** 00	**Practical =** 28			

8.Brief Syllabus

This course teaches the working of measurement systems and different types of sensors and transducers, physical parameters used in Industry and normal measurement applications. Understanding of thermocouples, piezoelectric and pyro-electric transducers and their applications.

9.Learning objectives:

- **i)** To provide knowledge about sensors.
- **ii)** To provide the knowledge about actuators.
- **iii)** To provide hands on experience.
- **iv)** To measure different signal using sensor and processing them in required form.

10.Course Outcomes: On completion of this course, the students will be able to

- **i)** Generate appropriate design procedure, suitable for signal conversion to interface with computer.
- **ii)** Design appropriate circuits by using conventional formulas used in signal conditioning and conversion.
- **iii)** Implement their design in bread board and test it.
- **iv)** Generate appropriate design procedure to obtain a required measurement data for temperature, force, humidity, displacement and sound.

11. Lab Content

Sr. No.	Title	CO covered
1	Design and testing of Digital Comparator	i,ii
2	Design and testing of Voltage to frequency converter and frequency to voltage converter.	ii
3	Design and testing of sample and hold circuit.	iii
4	Design and testing of Flash type Analog to Digital Converters..	iv
5	Design and testing of instrumentation amplifier using OP-AMP	ii
6	Displacement measurement using potentiometer and LVDT and plotting the characteristic curves.	ii
7	Study of Characteristics and calibration of strain gauge and Load Cell	iii

8	Measurement of strain using resistive type strain gauges with temperature compensation and various bridge configurations.	iv
9	Temperature measurement using Thermocouple, Thermistor and RTD and comparing the characteristics.	iii
10	Comparison of capacitive and resistive type transducer for humidity measurement with their characteristics.	iv
11	Measurement of sound using microphones and sound level meter.	i,ii

1.Name of the Department: Electrical and Electronics Engineering								
2.Course Name	Power Electronics		**L**	**T**		**P**		
3.Course Code			**3**	**0**		**0**		
4.Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**		**PE ()**
5.Pre-requisite (if any)	Analog Electronics	**6.requency (use tick marks)**		**Even ( )**	**Odd ()**	**Either Sem ()**		**Every Sem ()**

7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 42	**Tutorials = 00**	**Practical = 00**

8.Brief Syllabus

Power Electronics acquire understanding and ability to analyze power semiconductor devices, gate drive circuits, ac-dc converters & ac-ac and dc-ac converters. This course may also be useful for the practicing engineers who want to refresh their understanding in power electronics.

9.Learning objectives:

The students will learn and understand:

- **i)** To learn about the basic concepts of power electronics.
- **ii)** To study about different types of converters,
- **iii)** To learn about their characteristics, turn-on of SCR, gate characteristics,
- **iv)** To develop AC-DC Converters, DC - DC Converters, AC-AC and DC-AC Converters.

10. Course Outcomes: On completion of this course, the students will be able to

- **i)** Articulate the basics of power electronic devices
- **ii)** Express the design and control of rectifiers, inverters.
- **iii)** Design of power electronic converters in power control applications
- **iv)** Ability to express characteristics of SCR, BJT, MOSFET and IGBT.
- **v)** Ability to express communication methods.
- **vi)** Ability design AC voltage controller, Cyclo - Converter, Chopper circuits and Inverter circuit

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the Unit: Power Semiconductor Devices**

Applications of power electronics; types of converters, ideal switch; power diodes, SCR, Triac and their characteristics, di/dt, dv/dt limitations and snubber circuits, other power semiconductor devices and their characteristics.

Unit - 2	**Number of lectures = 10**	**Measurement: Gate Drive Circuits**

Methods of turn-on & off SCR, gate characteristics, simple R, RC and UJT trigger circuits, driver and isolation circuits, cosine and ramp control circuits, simple digital trigger circuit, commutation of SCR

Unit - 3	**Number of lectures = 12**	**AC-DC Converters & DC - DC Converters**

AC-AC Converter: Principle of ac phase control, circuit configurations, waveforms for 1-ph mid-point and bridge converters, full and semi converters, analysis of single phase ac-dc converter with R and RL loads, performance evaluation of phase controlled converters, introduction to three phase converters: semi and full converter topologies, dual-converters.

DC - DC Converters : Basic principle of d.c. choppers: TRC and CLC methods; switching regulators: buck and boost converters, basic principles of SMPS and UPS, Introduction to resonant converters.

Unit - 4	Number of lectures = 10	AC-AC and DC-AC Converters
Introduction to AC voltage regulators, integral cycle control and phase control, cyclo-converters. Series, parallel and bridge inverter circuits, PWM inverters: types of control and harmonic reduction.		

12. Brief Description of self learning / E-learning component:

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Books:

i) M.H. Rashid, Power Electronics; PHI Learning, New Delhi.

References Book:

i) Jai P Agarwal, Power Electronics Systems, Addison Wesely.
ii) V. R. Moorthy, Power Electronics, Oxford University 2007 Press.
iii) M. S. JamilAsghar, Power Electronics, PHI Learning.
iv) G.K.Dubey, et al, Thyristorised Power Controllers; New Age International, New Delhi.

1. **Name of the Department** : Electrical and Electronics Engineering

2.Course Name	Power Electronics Lab	L	T	P	
3.Course Code		0	0	2	

4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

5.Pre-requisite (if any)	**Semiconductor Devices and Circuits**	**6.Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()

7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials =** 00	**Practical =** 28

8.Brief Syllabus

Basic concept review of electrical machines; single phase transformers. 3-phase transformer; various types of connection of three phase transformer, Phase-Conversion & phase-shifting transformers, Swinburne's & Hopkinson's test of DC shunt M/Cs.

9.Learning objectives:

The students will learn and understand

i) To familiarize the different types of characteristics of various types Power Electronic Device.
ii) To realize various power electronic converters.
iii) To realize the triggering circuits for specific applications.

10.Course Outcomes: On completion of this course, the students will be able to

i) Interpret different characteristics of an SCR.
ii) Implement the phase controlled switching using DIAC and TRIAC.
iii) To realize different type of triggering circuits for particular application.
iv) To use UJT as a relaxation oscillator and for triggering circuits.
v) To implement different types of converters for various applications like speed control of DC motor.

11. Lab Content

Sr. No.	Title	CO covered
1	**Static Characteristics of SCR**	i
2	**TRIAC and AC phase control**	ii
3	**UJT based relaxation oscillator and trigger circuit**	iv
4	**R, RC trigger circuits and speed control of Universal motor.**	v
5	**Uncontrolled AC-DC Converter**	iii,v
6	**Monostable based trigger circuits.**	I,ii
7	**Speed control of DC motor by a phase controlled converter.**	v
8	**MOSFET based flyback DC-DC converter.**	Iv,v

1. Name of the Department		Electrical and Electronics Engineering					
2. Course Name	Research Methodology and IPR	L		T		P	
3. Course Code		3		0		0	
4. Type of Course (use tick mark)		**Core ()**	**EAS (√)**	**BSC ()**		**OE ()**	**PE ()**
5. Pre-requisite (if any)		**6. Frequency (use tick marks)**		Even (√)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		Tutorials = 00		Practical = 0			

8.Brief Syllabus:

The aim of the course is to make students understand the importance of Research Paper Writing. Also, it covers all the concepts which involved in writing the Research Paper.

9Learning objectives:

The objectives of the course are:

- **i)** The students are able to recognize the steps involved in doing research work.
- **ii)** The students will be able to collect data using various media and using the best possible sample available.
- **iii)** The students would learn to propose their Hypothesis and build models for the problem.
- **iv)** The students would be able to correctly document their findings in the form of a report.

10.Course Outcomes:

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

- **i)** Recognize the various steps involved in research.
- **ii)** Collect datca from samples, Examine and Analyze the data.
- **iii)** Develop models for problems.
- **iv)** Explain the entire process in the form of a report.

11.Unit wise detailed content

Unit-1	**Number of lectures = 12**	**Title of the unit: Introduction**

Research - Types, Research process and steps, Hypothesis, Research Proposal and aspects.Research Design- Need, Problem Definition, Variables, Research Design concepts, Literature survey and review, Research design process, Errors in research. Research Modeling- Types of models, model building and stages, Data consideration.

Unit - 2	**Number of lectures = 10**	**Title of the unit: Sampling**

Sampling and data collection- Techniques of sampling, Random, Stratified, Systematic, Multistage-sampling, Primary and secondary sources of data. Design of questionnaire.

Unit - 3	**Number of lectures = 10**	**Title of the unit: Data Collection and Experiments**

Design of Experiments- Objectives, strategies, Factorial experimental design, designing engineering experiments, basic principles-replication, randomization, blocking, guidelines for design of experiments.

Unit - 4	**Number of lectures = 10**	**Title of the unit: Models and Hypothesis & Report writing**

Single factor experiment- Hypothesis testing, analysis of Variance component (ANOVA) for fixed effect model; Total, treatment and error of squares, Degrees of freedom, Confidence interval; ANOVA for random effect model, estimation of variance components, Model adequacy checking.

Structure and components of Scientific Reports, Types of Report, Technical Reports and Thesis; Different steps in the preparation – Layout, structure and Language of typical reports; Illustrations and tables, Bibliography, Referencing and foot notes.

12.Brief Description of self learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.
The link to the E-Learning portal.
http://sgtlms.org
Journal papers; Patents in the respective field.

13.Books Recommended

Text Book:

i) Research Methodology – Methods and Techniques – C.R. Kothari, New Age International, New Delhi, 2004.

Reference Book:

i) Design and Analysis of Experiments – Douglas C. Montgomery, Wiley India, 8th Edition, 2012.

ii) Practical Research: Planning Design – Paul D. Leddy, London, 1980.

1. Name of the Department		Electrical and Electronics Engineering					
2. Subject Name	Research Methodology and IPR Lab	**L**		**T**		**P**	
3. Subject Code		0		0		2	
4. Type of Subject		**Core ()**	**EAS (√)**	**BSC ()**		**OE ()**	**PE ()**
5. Pre-requisite (if any)	Research Methodology and IPR	**Frequency (use tick marks)**		Even (√)	Odd ()	Either Sem ()	Every Sem ()
6. Total Number of Lectures, Tutorials, Practical, Assuming 14 weeks in semester							
Lectures = 00		**Tutorials = 00**		**Practical =28**			

7. Learning objectives:

The objectives of the course are:

- **i)** The students are able to recognize the steps involved in Identifying research problem.
- **ii)** The students will be able to collect data using various media and using the best possible sample available.
- **iii)** The students would learn to propose their Hypothesis and build models for the problem.
- **iv)** The students would be able to correctly document their findings in the form of a report.

8. **Learning outcomes :**

On completion of this course, the students will be able to

- **i)** Choose the topic for writing research paper.
- **ii)** Develop models for problems.
- **iii)** The students would learn to write the research paper.
- **iv)** Explain the entire process in the form of a report.

9. Lab Content

Sr. No.	**Title**	**CO covered**
1	How to choose topic for research	I,ii
2	How to collect data for the particular research problem	I,ii
3	Writing Abstract	I,ii
4	Writing Literature review	I,ii
5	Explaining and writing methodology	i.ii
6	How to analyze the data collected	I,ii
7	Presentation of analysis and findings	I,ii

8	How to write result and conclusion	Ii,iii
9	References in research article	Iii,iv

Semester V

1. Name of the Department- Electrical & Electronics Engineering							
2. Course Name	Automation in Machinery	**L**		**T**		**P**	
3. Course Code		**3**		**0**		**0**	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**PE ()**
5. Pre-requisite (if any)	Basics of Automation	**6. Frequency (use tick marks)**		Even ()	Odd (✔)	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 42	**Tutorials = 0**	**Practical = 0**

8. Course Description

A study of the applications of industrial automation systems, including identification of system requirements, equipment integration, motors, controllers, and sensors. Coverage of set-up, maintenance, and testing of the automated system.

Learning Objectives:

The students will learn and understand

- **i)** To introduce the importance of automation techniques manufacturing and process industries.
- **ii)** To impart the role of PLC in industry automation.
- **iii)** To expose to various control techniques employed in process automation.
- **iv)** To develop automation system for manufacturing and process industries.

10. Course Outcomes (COs):

On completion of this course, the students will be able to

- **i)** Familiar with various automation technologies in manufacturing and process industries.
- **ii)** Understand various automation tools and methods in the manufacturing industry.
- **iii)** Implement various control and automation methods in process industries.
- **iv)** Familiar with various communication technologies in manufacturing and process industries.

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the Unit: Introduction**

Automation in production system, Principles and strategies of automation, Basic elements of an automated system, Advanced automation functions, Levels of automations, Automated flow lines and transfer mechanisms, Analysis of transfer lines without storage, Automated flow lines with storage buffers.

Unit – 2	**Number of lectures = 12**	**Title of the Unit: Automation in Process Industries**

Introduction to computer based industrial automation- Direct Digital Control (DDC), Distributed Control System (DCS) and supervisory control and data acquisition (SCADA) based architectures. SCADA for process industries includes understanding of RTUs,

Pumping stations, Evacuation processes, Mass Flow Meters and other flow meters, Leak-flow studies of pipelines, Transport Automation.

Unit – 3	Number of lectures = 10	Title of the Unit: Programmable Logic Controller (PLC)-

Block diagram of PLC, Programming languages of PLC, Basic instruction sets, Design of alarm and interlocks, Networking of PLC, Overview of safety of PLC with case studies. Process Safety Automation: Levels of process safety through use of PLCs, Integrating Process safety PLC and DCS, Application of international standards in process safety control.

Unit – 4	Number of lectures = 11	Title of the Unit: Distributed Control System-

Local Control Unit (LCU) architecture, LCU Process Interfacing Issues, Block diagram and Overview of different LCU security design approaches, Networking of DCS. Introduction to communication protocols- Profibus, Field bus, HART protocols. Data gathering, Data analytics, Real-time analysis of data stream from DCS, Historian build, Integration of business inputs with process data, Leveraging RTU (as different from PLCs and DCS)

12**. Brief Description of self-learning / E-learning component**

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Books

i) M.P.Groover,"Automation, Production Systems and Computer Integrated Manufacturing", 5 th Edition, Pearson Education, 2009.

Reference Books

i) Curtis D. Johnson, "Process Control Instrumentation Technology", 8th Edition, Pearson New International, 2013.

ii) Lukas M.P, " Distributed Control Systems", Van Nostrand Reinhold Co., New York, 1986.

iii) John W. Webb and Ronald A. Reis, "Programmable Logic Controllers: Principles and Applications", 5th Edition, Prentice Hall Inc., New Jersey, 2003.

iv) Krishna Kant, "Computer - Based Industrial Control", 2nd Edition, Prentice Hall, New Delhi, 2011.

1. **Name of the Department** : Electrical and Electronics Engineering

2.Course Name	Automation in Machinery Lab	L	T	P
3.Course Code		0	0	2

4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

5.Pre-requisite (if any)	**Semiconductor Devices and Circuits**	**6.Frequency (use tick marks)**	Even ()	Odd (√)	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials =** 00	**Practical =** 28

8. Brief Syllabus

A study of the applications of industrial automation systems, including identification of system requirements, equipment integration, motors, controllers, and sensors. Coverage of set-up, maintenance, and testing of the automated system.

9. Learning objectives:

i) Impart knowledge in transmitter design

ii) Exposure to different PLC programming languages

iii) Able to provide adequate knowledge in SCADA and DCS

iv) Study of HART and Field bus protocol..

10. **Course Outcomes**: On completion of this course, the students will be able to

i) Gain confidence in development of conventional/ wireless IoT based transmitter suited for real time processes

ii) Get exposure in design of different controllers suitable for real time processes.

iii) Adequate programming skills using PLC, DCS and SCADA

iv) Gain knowledge on Ladder Logic programming.

11. Lab Content

Sr. No.	Title	CO covered
1	Design and development of two wire temperature Transmitter .	i
2	Design and development of IoT based transmitter.	i
3	Cascade and feedback controller design for real time process trainer.	I,ii
4	Feed forward and ratio controller design for real time process trainer.	I,ii
5	Development of combinational and sequential logic application using minimum PLC languages.	I,iii
6	Development of Ladder logic programme for control of real time processes.	iv
7	Development of SCADA for a control of real time processes.	iii
8	Study of HART and Field bus protocol	I,iii

9	P&I diagram development using simulation processes software for complex	iv
10	Study of Distributed Control Systems and different instruction sets.	ii
11	Development of Cascade, ratio and feedback controller using DCS simulation software	ii
12	Development of HMI and annunciator circuits using DCS simulation software	I,ii

1. Name of the Department: Electronics and Communication Engineering							
2. Course Name	Arduino	L		T		P	
3. Course Code		3		0		0	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**PE ()**
5. Pre-requisite (if any)	Microprocessor knowledge & understanding	**6. Frequency (use tick marks)**		Even ( )	Odd (√)	Either Sem ( )	Every Sem ( )
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		Tutorials = 00		Practical = 00			

8. Brief Syllabus

This workshop aims to demystify the Arduino microcontroller through hands-on work in the lab creating simple machines with embodied behaviors. The Arduino is a versatile resource for physical projects for students in all disciplines. This course brings students over the beginner's threshold to a basic understanding of the use, terminology, and potential of the Arduino.

9. Learning objectives:

- **i)** The main objective of this training course is to equip participant of fundamental understanding of embedded systems with Arduino.
- **ii)** Have good understanding of microcontroller, specifically of Arduino microcontrollers
- **iii)** Confidently construct and troubleshoot a microcontroller circuit for various applications
- **iv)** Participants will get the skills of how to communicate with Arduino boards over different interfaces

10. Course Outcomes: After completion of this course, student will be able to

- **i)** Determine the need of suitable processor & sensors to deal a problem
- **ii)** To design an appropriate design & solution.
- **iii)** To develop the hardware module capable to fulfill the need of application

11. Course Contents

Unit 1	**No.of Lectures: 10**	**Title of Unit: Introduction to Embedded Systems**

Introduction to Open Source platform, Introduction of Electronic Components, Introduction to Sensors, Introduction to Computational Devices, Introduction to embedded system

Unit 2	**No. of Lectures: 8**	**Title of Unit: Introduction to Sensors**

Sensor, Various Basic Industrial Sensors: IR Analog Sensor, IR Digital Sensor, Color IR _TSOP Sensor, Light Sensor, Sound Sensor, Interfacing of sensor; Computational Devices & uses of Various Computation Device.

Unit 3	**No. of lectures: 9**	**Title of Unit: Interfacing-I**

Actuator & its Interfacing, Interfacing of DC Motor & DC Geared Motor, Interfacing of Stepper Motor & Servo Motor, Drive motor using H-Bridge Motor Drive & Advanced Motor Driver

Unit 4	**No. of lectures: 10**	**Title of Unit: Interfacing-II**

Introduction to Programming Languages, Write programming code for blinking LED's and LCD devices, Program ADC and DAC for the communication in real time applications, program for Keypad, analog

Voltage Sensor, digital Buzzer Module.

12. Books Recommended

Text Book:

i) Beginning Arduino – Michael McRoberts

Reference Book:

i) Arduino Cookbook by Michael Margolis

1. **Name of the Department** : Electrical and Electronics Engineering

2. Course Name	Aurdino Lab	L	T	P
3. Course Code		0	0	2

4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

4. Pre-requisite (if any)	**Semiconductor Devices and Circuits**	**5. Frequency (use tick marks)**	Even ()	Odd (√)	Either Sem ()	Every Sem ()

6. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials =** 00	**Practical =** 28

7. Brief Syllabus

The Arduino is a versatile resource for physical projects for students in all disciplines. This course brings students over the beginner's threshold to a basic understanding of the use, terminology, and potential of the Arduino. The skills and concepts taught in this course are presented from an interdisciplinary approach which merges practices in arts and technology.

8. Learning objectives:

At the end of this lab you should be able to:

i) Describe the basic functioning of the "standard" Arduino microcontroller board
ii) Describe the capabilities of the Spartronics Experimenter Shield.
iii) Describe how it relates to the Arduino.

9. **Course Outcomes**: On completion of this course, the students will be able to

v) Configure the Arduino IDE to communicate with the Arduino hardware
vi) Use the Arduino IDE to load (provided samples and user-written) programs
vii) Use Compile provided samples and user-written) programs
viii) To download and execute provided samples and user-written) programs

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11. Lab Content

Sr. No.	Title	CO covered
1	Introduction to C Programming	i
2	Using Standard I/O	i
3	Using Conditionals	I,ii
4	Using Loops	I,ii
5	Intro to Addresses, Pointers and Handles	I,iii
6	Hello Arduino	I, iv
7	Arduino Digital Output	I,iv
8	Arduino Digital Input	I,iv
9	Arduino Analog Input	Iii,iv
10	Arduino Reaction Timer	Ii,iii

1. Name of the Department- Electrical and Electronics Engineering							
2.Course Name	**Internet of things**	**L**		**T**		**P**	
3.Course Code		3		0		0	
2. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**OE ()**
3. Pre-requisite (if any)	NIL	**4. Frequency (use tick marks)**		Even ()	Odd (√)	Either Sem ()	Every Sem ()
5. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		**Tutorials = 00**		**Practical = 00**			

6. Brief Syllabus

An overview of protocols involved in Internet of Things devices and applications. Help clarify with IoT layer technology stack and head-to-head comparisons. The Internet of Things covers a huge range of industries and use cases that scale from a single constrained device up to massive cross-platform deployments of embedded technologies and cloud systems connecting in real-time. At the same time, dozens of alliances and coalitions are forming in hopes of unifying the fractured and organic IoT landscape.

7. Learning objectives: The objective of this course is

i) To impart knowledge on IoT Architecture and

ii) To study various protocols.

iii) To study their implementations

8. Course Outcomes: On completion of this course, the students will be able to

i) Understand the Architectural Overview of IoT.

ii) Understand the IoT Reference Architecture .

iii) Understand the Real World Design Constraints.

iv) Understand the various IoT Protocols (Datalink, Network, Transport, Session, Service)

9. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the Unit: Overview**

IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

Unit - 2	**Number of lectures = 12**	**Title of the Unit: Reference Architecture**

IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference ArchitectureIntroduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

Unit - 3	**Number of lectures = 10**	**Title of the Unit: IOT Data Link Layer & Network Layer Protocols**

PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), WirelessHART,Z-Wave,Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP

Unit - 4	**Number of lectures = 10**	**Title of the Unit: Transport & Session Layer Protocols**

Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT UNIT V – SERVICE LAYER PROTOCOLS & SECURITY (12 hours) Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 , 6LoWPAN, RPL, Application Layer .

10. Brief Description of self learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

11. Books Recommended

Text book:

i) Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.

Reference Book:

i) Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI**.**

ii.Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

iii.Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications

iv. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1 st Edition, VPT, 2014.

1. **Name of the Department** : Electrical and Electronics Engineering						
2.Course Name	Internet of Things Lab	L	T	P		
3.Course Code		0	0	2		
4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**OE ()**	
5.Pre-requisite (if any)	**Semiconductor Devices and Circuits**	**6.Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()
7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		**Tutorials =** 00	**Practical =** 28			

8.Brief Syllabus

An overview of protocols involved in Internet of Things devices and applications. Help clarify with IoT layer technology stack and head-to-head comparisons. The Internet of Things covers a huge range of industries and use cases that scale from a single constrained device up to massive cross-platform deployments of embedded technologies and cloud systems connecting in real-time. At the same time, dozens of alliances and coalitions are forming in hopes of unifying the fractured and organic IoT landscape.

11. Learning objectives:

The students will learn and understand

i) To get introduced with hardware & software for the IoT application development board.

ii) To be familiar with communication protocol

iii) To explore the hardware & software features.

iv) Design & develop any hardware applications.

12. **Course Outcomes**: On completion of this course, the students will be able to

i) Understand the characteristics of IoT applications development board & software.

ii) Understand the properties of IOT development software.

iii) Understand the interfacing with sensors & actuators.

iv) Understand the designing and developed the IoT applications.

11. Lab Content

Sr. No.	Title	CO covered
1	Study and understanding of development board for IoT applications.	I,iv
2	Explore the software used for programming and its programming model.	ii
3	Interaction with analog/digital communication port.	iv
4	Interfacing of LED's	I
5	Interfacing of switches to control the operation of LED's.	I,iii
6	Interfacing of DC motors	Iv
7	Interfacing of matrix keyboard with IoT processor	iii
8	Interfacing of LCD module	I,iii
9	Uses of ADC characteristics	iv
10	Interfacing with analog sensors	ii

11	Interfacing with digital sensors.	iii
12	Interfacing with temperature sensors	iii
13	Interfacing with multiple sensors & actuators.	iii
14	Interfacing with different communication modules.	iv

Semester VI

1. Name of the Department- Electrical & Electronics Engineering							
2. Course Name	**Electrical Machines**	**L**		**T**		**P**	
3. Course Code		**3**		**0**		**0**	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**OE ()**
5. Pre-requisite (if any)	Basic Electrical Engineering	**6. Frequency (use tick marks)**		Even (✔)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		**Tutorials = 0**		**Practical = 0**			

8. Course Description

Basic concept review of electrical machines; single phase transformers. Auto-transformer; various types of connection of three phase transformer Phase-Conversion & phase-shifting transformers, construction and working of D.C. machines.

9. Learning Objectives:

The students will learn and understand

- **i)** To understand the basic working principle of electrical machines
- **ii)** To analyse the performance of synchronous and
- **iii)** To analyse the performance of induction machines

10. Course Outcomes (COs):

On completion of this course, the students will be able to

- **i)** Master modern signal processing tools including vector spaces, bases and frames, operators, signal expansions and
- **ii)** Classical signal processing tools including Fourier and z transforms, filtering, and sampling.
- **iii)** Apply the above tools to real-world problems including spectral analysis, filter design, noise cancellation, signal compression, rate conversion, feature extraction, inverse problems, machine learning and
- **iv)** To justify why these are appropriate tools.

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the Unit: Transformers**

Principle, construction of core, winding & tank, operation, testing of single phase transformer, equivalent circuit, phasor diagram, parameters determination, P.U. representation of parameters, regulation, losses & efficiency, separation of iron losses. Parallel operation of single phase transformers. Auto-transformer: Principle, construction, comparison with two winding transformers, application.

Unit – 2	**Number of lectures = 12**	**Title of the Unit: Three Phase Transformer**

Various types of connection of three phase transformers, their comparative features, Zig-Zag connection. Parallel operation of single phase & three phase transformers, Auto-transformer: Principle, construction, comparison with two winding transformers, application. Nature of magnetizing current, plotting of magnetizing current from B-H curve, Inrush current, harmonics,

effect of construction on input current, connection of three phase transformer. Phase-Conversion: Three to two phase, three to six phase and three to twelve phase conversions. Introduction to three winding, tap-changing & phase-shifting, transformers.

Unit – 3	**Number of lectures = 10**	**Title of the Unit: D.C. MACHINES:**

Elementary DC machine, principle & construction of D.C. generator, simplex lap and wave windings, E.M.F. equation, armature reaction, compensating winding, commutation, methods of excitation, load characteristics, parallel operation.

Unit – 4	**Number of lectures = 10**	**Title of the Unit: DC Motors:**

Principle of DC Motors, torque and output power equations, load characteristics, starting, speed control, braking, testing, efficiency & applications.

12.Brief Description of self learning / E-learning component:

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13.Books Recommended

Text Books

i) Electric Machines: I.J.Nagrath and D.P.Kothari, TMH, New Delhi.

Reference Books:

i) Electric Machinery, Fitzgerald & Kingsley, MGH.

ii) Theory of alternating current machinery, A.S. Langsdorf , TMH.

iii) Performance & Design of D.C. Machines: A.E. Clayton & N.N. Hancock; ELBS)

iv) Electrical Machines – (Vol – II) By B L Theraja , S Chand

1. **Name of the Department** : Electrical and Electronics Engineering

2.Course Name	Electrical Machines Lab	L	T	P
3.Course Code		0	0	2

4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

5.Pre-requisite (if any)	**Basic Electrical and Electronics Engineering**	**6.Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()

7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials =** 00	**Practical =** 28

8.Brief Syllabus

Basic concept review of electrical machines; single phase transformers. 3-phase transformer; various types of connection of three phase transformer, Phase-Conversion & phase-shifting transformers, Swinburne's & Hopkinson's test of DC shunt M/Cs.

9.Learning objectives:

At the end of this lab Students will be able to:

i) To understand the basic working principle of electrical machines
ii) To analyse the performance of 1 phase and
iii) To analyse the performance of 3 Phase transformer.

10.Course Outcomes: On completion of this course, the students will be able to

Upon The students will be able to:-

i) Convert 3 Phase into six phase by using 3 single phase transformers.
ii) Perform load test on DC shunt generator.
iii) Performed Ward Leonard method of speed control.

11. Lab Content

Sr. No.	**Title**	**CO covered**
1	Conversion of 3 Phase to six phase using 3 single phase transformers..	i
2	To study three phase rectifiers & supply configuration in 3 phases.	i
3	To perform Sumpner's Back to back test on 1-phase transformers.	i
4	Parallel operation of two 1-phase transformers	i
5	To convert three phase to 2-phase By Scott-connection	i
6	To perform load test on DC shunt generator.	ii
7	Speed control of DC shunt motor.	ii
8	Swinburne's test of DC shunt motor.	ii
9	Hopkinson's test of DC shunt M/Cs	iii
10	Ward Leonard method of speed control.	iii

1. Name of the Department- Electrical & Electronics Engineering							
2. Course Name	**Analog and Linear Integrated Circuits**	**L**		**T**		**P**	
3. Course Code		**3**		**0**		**0**	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**OE ()**
5. Pre-requisite (if any)		**6. Frequency (use tick marks)**		Even (✔)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		**Tutorials = 0**		**Practical = 0**			

8. Course Description

A linear integrated circuit (linear IC) is a solid-state analog device characterized by a theoretically infinite number of possible operating states. It operates over a continuous range of input levels. In contrast, a digital IC has a finite number of discrete input and output states.

9. Learning Objectives:

- **i)** To understand the basics of linear integrated circuits and available ICs
- **ii)** To understand the characteristics of the operational amplifier.
- **iii)** To apply operational amplifiers in linear and nonlinear applications.
- **iv)** To acquire the basic knowledge of special function IC.

10. Course Outcomes (COs):

Upon completion of this course , students will be able to

- **i)** Describe the various ideal and practical characteristics of an OPAMP.
- **ii)** Develop simple OPAMP based circuits.
- **iii)** Implement various analog signal processing circuits.
- **iv)** Analyze and design various types of ADCs and DACs.
- **v)** Analyze and construct various application circuits using 555 timer.

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the Unit: Operational Amplifier**

Block diagram of a typical op-amp – characteristics of ideal and practical op-amp - parameters of opamp – inverting and non-inverting amplifier configurations - frequency response - circuit stability.

Unit – 2	**Number of lectures = 12**	**Title of the Unit: Applications of Operational Amplifier**

DC and AC amplifiers - summing amplifier – difference amplifier – voltage follower – differentiator – integrator- clamper - clipper– filters, Oscillators, sine wave, square wave, triangular wave, saw tooth wave generation, Schmitt trigger, window detector.

Unit – 3	**Number of lectures = 10**	**Title of the Unit: A/D and D/A converter and PLL**

Analog-to-digital, digital-to-analog, sample and hold circuits; voltage controlled oscillator, phase locked loop – operating principles, applications of PLL

Unit – 4	Number of lectures = 10	Title of the Unit: Timer and Regulators
IC555 Timer, monostable and astable modes of operation; voltage regulators - fixed voltage regulators, adjustable voltage regulators - switching regulators.		

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Books:

i) Gayakwad R.A., 'Op-amps & Linear Integrated Circuits', Prentice Hall of India, New Delhi, 4th Edition, 2009.

Reference Books:

i) Sergio Franco,' Design with Operational Amplifiers and Analog Integrated Circuits', Tata McGraw Hill, 3rd Edition, 2002.

ii) Sedra Smith, 'Microelectronic Circuits', Oxford University Press, 6th Edition, 2009.

iii) R P Jain, 'Modern Digital Electronics', Tata McGraw-Hill Education, 3rd Edition, 2003.

iv) 2. Roy Choudhury and Shail Jain, 'Linear Integrated Circuits', 4th Edition, New Age International Publishers, 2010.

1. **Name of the Department** : Electrical and Electronics Engineering

2.Course Name	Analog and Linear Integrated Circuits Lab	L	T	P
3.Course Code		0	0	2

4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

5.Pre-requisite (if any)	**Semiconductor Devices and Circuits**	**6. Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials** = 00	**Practical** = 28

8. Brief Syllabus

The Arduino is a versatile resource for physical projects for students in all disciplines. This course brings students over the beginner's threshold to a basic understanding of the use, terminology, and potential of the Arduino. The skills and concepts taught in this course are presented from an interdisciplinary approach which merges practices in arts and technology.

9. Learning objectives:

At the end of this lab Students will be able to:

i) To understand the basics of linear integrated circuits and available ICs
ii) To understand the characteristics of the operational amplifier.
iii) To apply operational amplifiers in linear and nonlinear applications.
iv) To acquire the basic knowledge of special function IC.

10. **Course Outcomes**: On completion of this course, the students will be able to

Upon completion of this course , students will be able to

i) Describe the various ideal and practical characteristics of an OPAMP.
ii) Develop simple OPAMP based circuits.
iii) Implement various analog signal processing circuits.
iv) Analyze and design various types of ADCs and DACs.
v) Analyze and construct various application circuits using 555 timer

11. Lab Content

Sr. No.	**Title**	**CO covered**
1	Inverting, Non inverting and differential amplifiers.	i
2	Integrator and Differentiator.	i
3	Instrumentation amplifier	I,ii
4	Active low-pass, High-pass and band-pass filters.	I,ii
5	Astable and Monostable multivibrators using Op-amp	I,ii
6	Schmitt Trigger using op-amp.	I, ii
7	Phase shift and Wien bridge oscillators using Op-amp.	I,ii
8	Astable and Monostable multivibrators using NE555 Timer.	I,ii

9	PLL characteristics and its use as Frequency Multiplier, Clock synchronization	iii,iv
10	R-2R Ladder Type D- A Converter using Op-amp.	iv

1. Name of the Department- Electrical and Electronics Engineering							
2 .Course Name	Programming Language – Python	**L**		**T**		**P**	
3. Course Code		**3**		**0**		**0**	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**PE ()**
5. Pre-requisite (if any)	Operating System	**6. Frequency (use tick marks)**		Even ()	Odd (□)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		**Tutorials = 0**		**Practical = 00**			

8. Brief Syllabus: The course begins with the concepts of Python Programming Language with Libraries. Python is next generation multi-purpose programming language that allows different users to create applications of various domains. Students will be able to learn primary fundamentals of python programming and potential of python is to achieve modern computing requirements.

9. Course Objectives:

i) Master the fundamentals of writing Python scripts.
ii) Learn core Python scripting elements such as variables and flow control tructures.
iii) Discover how to work with lists and sequence data.
iv) Use Python to read and write files.

11. Course Outcomes:

On completion of this course, the students are expected to learn
i) To learn basics of Python.
ii) To develop console application in python.
iii) To develop database application in python.
iv) To develop basic machine learning application.

12. Unit wise detailed content

Unit-1	**Number of lectures = 12**	**Title of the Unit: Python programming Basic**

Python interpreter, IPython Basics, Tab completion, Introspection,
%run command, magic commands, matplotlib integration, python programming, language semantics, scalar types. Control flow,
Data Structure, functions, files: tuple, list, built-in sequence function, dict, set, functions, namescape, scope, local function, returning multiple values, functions are objects, lambda functions, error and exception handling, file and operation systems

Unit - 2	**Number of lectures = 10**	**Title of the Unit : NumPy: Array and vectorized computation:**

Multidimensional array object. Creating ndarrays, arithmetic with numpy array, basic indexing and slicing, Boolean indexing, transposing array and swapping axes, universal functions, array-oriented programming with arrays, conditional logic as arrays operations, file input and output with array

Unit - 3	**Number of lectures = 10**	**Title of the Unit: Pandas**

Pandas data structure, series, DataFrame, Index Object, Reindexing, dropping entities from an axis, indexing, selection and filtering, integer indexes, arithmetic and data alignment, function application and mapping, soring and ranking, correlation and covariance, unique values, values controls and membership, reading and writing data in text format

Unit - 4	**Number of lectures = 10**	**Title of the Unit: Visualization with Matplotlib:**

Figures and subplots, colors, markers, line style, ticks, labels, legends, annotation and drawing on sublots, matplotlib configuration

Plotting with pandas and seaborn: line plots, bar plots, histogram, density plots, scatter and point plots, facet grids and categorical da

13. Brief Description of self learning / E-learning component:

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field

14. Books Recommended:

TextBook:

i) Learning Python: Powerful Object-Oriented Programming by Lutz M - Shroff; Fifth edition

Reference books:

i) Python: The Complete Reference by Martin C. Brown - McGraw Hill Education; Forthedition

ii) Pandas for Everyone: Python Data Analysis by Daniel Y. Chen - Pearson Education; Firstedition

1. **Name of the Department** : Electrical and Electronics Engineering

2.Course Name	Programming Language –Python Lab	L	T	P
3.Course Code		0	0	2

4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

5.Pre-requisite (if any)	**Basic Electrical and Electronics Engineering**	**6.Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ()	Every Sem ()

7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 0	**Tutorials =** 00	**Practical =** 28

8.Brief Syllabus

Python is next generation multi-purpose programming language that allows different users to create applications of domains. Students will be able to learn primary fundamentals of python programming and potential of python is to achieve modern computing requirements.various

9.Learning objectives:

I. Master the fundamentals of writing Pythonscripts.
II. Learn core Python scripting elements such as variables and flow controlstructures.
III. Discover how to work with lists and sequencedata.
IV. Write Python functions to facilitate codereuse.

10.Course Outcomes: On completion of this course, the students will be able to

After completion of this course, student will be able to
I. To learn basics of Python
II. To develop console application in python
III. To develop database application inpython
To develop basic machine learningapplication

11. Lab Content

Sr. No.	**Title**	**CO covered**
1	Implement a Python program to Calculate GCD of two numbers.	i
2	Implement a Python Program to calculate the square root of a number by Newton's Method.	i
3	Implement a Python program to calculate the exponentiation of a number.	ii
4	Para Implement a Python Program to calculate the maximum from a list of numbers.	iii
5	Implement a Python Program to perform Search	ii
6	Implement a Python Program to perform Liner search	iv

7	Implement a Python Program to perform Binary search	iii
8	Implement a Python Program to perform insertion sort.	ii
9	Implement a Python Program to perform selection sort.	iv
10	Implement a Python program to multiply matrices.	iii
11	Implement a Python program to Calculate the most frequent words in a text read from a file.	ii
12	Implement function overloading with different function signatures	iv
13	Implement concept of class, instances and inheritance.	iv
14	Implement internal and external library.	iii
15	Solve algorithmic problems by program using different problem solving strategies.	iii
16	Search content using regular expression library in python.	iv
17	Implement Matrix multiplication using multi-threading in python	iii

Semester VII/VIII

1. **Name of the Department:** Electronics and Communication Engineering								
2. Course Name	Control System	**L**		**T**		**P**		
3. Course Code		3		0		0		
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**		**OE ()**	**PE ()**	
5. Pre-requisite (if any)	Signals & System	6. **Frequency (use tick marks)**	Even ()	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	

7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)

Lectures = 42	**Tutorials = 00**	**Practical = 00**

8. Brief Syllabus

Study of analog and computer controlled systems, classical and modern control system design methods, state space, dynamics of linear systems, and frequency domain analysis and design techniques. Analysis of linear feedback systems, their characteristics, performance, and stability. The Routh-Hurwitz, Root-locus, Bode, and Nyquist techniques are used for judge the stability of the system.

9. **Learning objectives**: The students will learn and understand
   - **i)** Methodology for modeling mechanical, electrical, and other types of dynamic systems using frequency domain and
   - **ii)** Methodology for modeling mechanical, electrical, and other types of dynamic systems using state-space techniques.
   - **iii)** Principles of feedback control to a variety of scientific disciplines.

10. **Course Outcomes**: On completion of this course, the students will be able to
   - **i)** Know the methodology for modeling dynamic systems
   - **ii)** Work with state-space models and
   - **iii)** Work with their application to frequency domain models.
   - **iv)** Design feedback controllers and compensators to achieve desired performance specifications

11. Unit wise detailed content

Unit-1	**Number of lectures = 10**	**Title of the unit: Introduction to Control System**

Open loop & closed control; servomechanism, Physical examples. Transfer functions, Block diagram algebra, and Signal flow graph, Mason's gain formula Reduction of parameter variation and effects of disturbance by using negative feedback.

Unit – 2	**Number of lectures = 12**	**Title of the unit: Time Response analysis**

Standard test signals, time response of first and second order systems, Design specifications of 1^{st} & 2^{nd} order systems: Derivative error, derivative output, integral error and PID compensations, design considerations for higher order systems.

Unit – 3	**Number of lectures = 10**	**Title of the unit: Concept of Stability & Algebraic Criteria**

Concept of Stability, Necessary condition for Stability, Routh Hurwitz Stability Criterion, Relative Stability Analysis, and Stability of Systems modeled in State variable form. Root locus, Sensitivity of roots of

Characteristic equations.		
Unit – 4	**Number of lectures = 10**	**Title of the unit: Frequency response Analysis and state space analysis**
Polar and inverse polar plots, Bode plots, Stability in Frequency Domain: Nyquist stability criterion; assessment of relative stability: gain margin and phase margin;		

12. Brief Description of self learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org Journal papers; Patents in the respective field.

13. Books Recommended

Text book:

i) Nagrath & Gopal, "Control System Engineering", 4th Edition, New age International, ISBN: 0130980412. 8.

Reference Books:

i) K. Ogata, "Modern Control Engineering", Prentice Hall of India, 3rd edition ISBN: 0132273071

ii) Norman S. Mise, Control System Engineering 4th edition, Wiley Publishing Co, ISBN: 0132273071.

1. **Name of the Department** : Electrical and Electronics Engineering						
2.Course Name	**Control System lab**	L		T		P
3.Course Code		0		0		2
4. Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**	
5.Pre-requisite (if any)	Analog circuit	**6.Frequency (use tick marks)**	Even ()	Odd (√)	Either Sem ()	Every Sem ()
7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		**Tutorials =** 00		**Practical =** 28		

8.Brief Syllabus

Study of analog and computer controlled systems, classical and modern control system design methods, state space, dynamics of linear systems, and frequency domain analysis and design techniques. Analysis of linear feedback systems, their characteristics, performance, and stability. The Routh-Hurwitz, Root-locus, Bode, and Nyquist techniques are used for judge the stability of the system.

9. Learning objectives:

i. Methodology for modeling mechanical, electrical, and other types of dynamic systems using frequency domain and
ii. Methodology for modeling mechanical, electrical, and other types of dynamic systems using state-space techniques.
iii. Principles of feedback control to a variety of scientific disciplines.

10. Course Outcomes: On completion of this course, the students will be able to

After completion of this course, student will be able to

i. Know the methodology for modeling dynamic systems
ii. Work with state-space models and
iii. Work with their application to frequency domain models.
iv. Design feedback controllers and compensators to achieve desired performance specifications

11. Lab Content

Sr. No.	Title	CO covered
1	Plot the pole-zero configuration in s-plane for the given transfer function.	i
2	Determine the transfer function for given closed loop system in block diagram representation.	ii
3	Plot unit step response of given transfer function and finds delay time, rise time, peak time and peak overshoot.	I,ii
4	Determine the time response of the given system subjected to any arbitrary input.	iii
5	Draw the Bode Plot for a given system and determine the stability	iii
6	Draw the root locus for a given system	iv

7	Determine the stability of a given system by routh Hurwitz criterion.	Iii,iv
8	Draw the polar plot for a given system.	ii
9	Determine the 1^{st} order response of a given system	ii
10	Determine the 2^{nd} order response of a given system	Iii,iv

1. Name of the Department- Computer Science & Engineering							
2. Course Name	**Java Programming**	**L**		**T**		**P**	
3. Course Code		**3**		**0**		**4**	
4. Type of Course (use tick mark)		**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**OE ()**	
5. Pre-requisite (if any)		**6. Frequency (use tick marks)**		Even (□)	Odd ()	Either Sem()	Every Sem (2)
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 42		**Tutorials = 0**		**Practical = 0**			

8. Course Description

This course of study builds on the skills gained by students in Java programming Students will design object-oriented applications with Java and will create Java programs using hands-on, engaging activities

11. Learning objectives:

i. This module gives students the skills to understand java programming.
ii. This module gives students the knowledge to understand java programming
iii. How to write Java code according to Object-Oriented Programming principles
iv. How to design GUI applications and Applets using AWT.

10. Course Outcomes (COs):

i. Describe Java concepts.
ii. Identify various data types.
iii. Evaluate various java concept using programs.

11. Unit wise detailed content

Unit-1	**Number of lectures = 12**	**Title of the unit: Importance and features of Java**

Importance and features of Java: Introduction to JVM ,Language Construct of java including Keywords, constants, variables and looping and decision making construct, Classes and their implementation, Introduction to JVM and its architecture including set of instructions.
Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance.
Arrays and String: Creating an array, one and two dimensional arrays, string array and methods

Unit – 2	**Number of lectures = 10**	**Title of the unit: Exception Handling**

Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions,
Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Runnable interface, inter thread Communication, suspending, resuming and stopping threads.

Unit – 3	**Number of lectures = 10**	**Title of the unit: Input/Output Programming:**

Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files. **Networking:** Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming, RMI (Remote Method Invocation).

Unit – 4	**Number of lectures = 10**	**Title of the unit: Event Handling**

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event

Listener Interfaces, Adapter and Inner Classes, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet.

The Collection Framework: The Collection Interface, Collection Classes, Working with Maps & Sets.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E- Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

http://sgtlms.org

Journal papers; Patents in the respective field.

13. Books Recommended

Text Books

i) Patrick Naughton and Herbertz Schildt, ―Java-2: The Complete Reference‖, TMH, Tenth edition

Reference Books

i) E. Balaguruswamy, –Programming withJava: APrimer‖,McGraw-Hill; Sixth edition, 2019.

ii) Core Java: An Integrated Approach, New: Includes All Versions upto Java 8, R. Nageswara Rao, DreamTech Press, 2016.

1. **Name of the Department** : Electrical and Electronics Engineering				
2.Course Name	Java Programming Lab	L	T	P
3.Course Code		0	0	2

4.Type of Course (use tick mark)	**Core (√)**	**EAS ()**	**BSC ()**	**OE ()**	**PE ()**

5.Pre-requisite (if any)		**6.Frequency (use tick marks)**	Even ()	Odd (√)	Either Sem ()	Every Sem ()

7.Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)		
Lectures = 0	**Tutorials** = 00	**Practical** = 28

8.Brief Syllabus

The course emphasis programming in the Java programming language and knowledge of object-oriented paradigm in the Java programming language make the students expertise the use of Java in a variety of technologies and on different platforms.

9.Learning objectives:

i. i)How to write Java code according to Object-Oriented Programming principles
ii. How to design GUI applications and Applets using AWT.

10.Course Outcomes: On completion of this course, the students will be able to

- **i.** Describe Java concepts.
- **ii.** Identify various data types.
- **iii.** Evaluate various java concept using programs.

11.Lab Content

Sr. No.	**Title**	**CO covered**
1	Make a java Program to check even or Odd Number	i
2	Implement Function overloading concept.	I,ii
3	Fibonacci Series in Java	I,ii
4	Prime Number Program in Java	iii
5	Palindrome Program in Java	iii
6	Factorial Program in Java	iii
7	Write a program to implement the concept of inheritance having a base class representing a person, derived from this class make two classes, one about the students and other about employees. Input & output this information about students &employees..	I,ii
8	Create an Applet Creating Thread which will move a String Continuously.	ii
9	Make a program using applets which will handle mouse events on client side.	iii

10	Make a program using applets which will handle key events on client side.	Ii,iii