GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: COMPUTER AIDED ELECTRICAL DRAWING AND SIMULATION (Code: 3340905)

Diploma Programmes in which this course is offered	Semester in which offered
Electrical Engineering	**4th Sem**

1. RATIONALE

The diploma electrical engineering students are required to draw and simulate electrical and electronics circuit in the industry before actually preparing hardware. The knowledge and skill can be developed through "COMPUTER AIDED ELECTRICAL DRAWING AND SIMULATION" which will be useful in industries for using various software for drawing and simulating. This course is designed in such a way that practical performed in this subject will enhance their skills to compete in fast growing electrical industry and understand different circuits by simulation. They will be able to send and receive drawings using internet and modify drawings easily.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

i. Draw electrical and electronics circuit using software.

ii. Simulate electrical and electronics circuit using software.

3. Course Outcomes:

Student will be able to:

- Draw various electrical and electronics circuit.
- Use the knowledge of simulation to understand test and design of the basic electrical and electronics circuit.
- Select proper electrical software for drawing and simulating electrical and electronics circuit.

(The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency)

4. Teaching and Examination Scheme

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	
0	0	4	4	00	00	40	60	100

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit **ESE** - End Semester Examination; **PA** - Progressive Assessment.

5. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I. COMPUTER AIDED ELECTRICAL DRAWING	1a. Select and use softwares for drawing various Electrical circuits.	1.1 Draw Electrical symbols (take Print out) 1.2 Draw D.C. machine parts (take print out) 1.3 Draw A.C.machine parts (take print out) 1.4 Draw R-L series circuit (take print out) 1.5 Draw R-C series circuit (take print out) 1.6 Draw R-L-C series circuit (take print out) 1.7 Draw A.C. & D.C. winding diagrams (take print out)
Unit– II COMPUTER AIDED ELECTRONICS DRAWING	2a Select and use softwares for drawing various Electronic circuits.	2.1 Draw Solid state semiconductor devices Symbol (take Print out) 2.2 Draw half wave, full wave and bridge rectifier circuit (take print out) 2.3 Draw power amplifier and voltage amplifier circuit (take print out) 2.4 Draw different types of oscillators circuit (take print out)
Unit– III SIMULATION OF ELECTRICAL CIRCUITS	3a Select and use softwares for Electrical circuit solutions	3.1 To measure voltage across (a)Series R-L circuit (b)Series R-C circuit (c)Series R-L-C circuit (take print out of all) 3.2 Electrical machines circuits solution (take print out)

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit–IV SIMULATION OF ELECTRONICS CIRCUITS	4a Select and use softwares for Electronic circuit solutions	4.1 Rectifier circuit solution (take print out) 4.2 Amplifier circuit solution (take print out) 4.3 Oscillator circuit solution (take print out)
Unit-V COMPUTER AIDED PCB DESIGN	5a Use computer softwares for designing PCB .	5.1 Awareness of software for PCB design 5.2 PCB layout of rectifier circuit (take print out) 5.3 PCB layout of amplifier circuit (take print out) 5.4 PCB layout of oscillator circuit (take print out)

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Practical Hours	Distribution of Practical Marks			
			R Level	U Level	A Level	Total Marks
I	**COMPUTER AIDED ELECTRICAL DRAWING**	16				
II	**COMPUTER AIDED ELECTRONICS DRAWING**	16				
III	**SIMULATION OF ELECTRICAL CIRCUITS**	08	NOT	APPLICABLE		
IV	**SIMULATION OF ELECTRONICS CIRCUITS**	08				
V	**COMPUTER AIDED PCB DESIGN**	16				
	Total	**56**				

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills **(Outcomes in cognitive, psychomotor and affective domain)** so that students are able to acquire the competencies.
Following is the list of practical exercises for guidance.

Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain

S. No.	Unit No.	Practical Exercises (Outcomes' in Psychomotor Domain)	Hrs. required
1	I	Draw electrical and electronic symbols and take print out with the help of computer	04
2	I	Draw D.C. & A.C machine parts and take print out	04
3	I	Develop winding diagram for given data and take print out (a)Lap winding (b)Wave winding	04
4	II	Draw following different types of rectifier circuit and take print out (a)Single phase half wave (b)Single phase full wave (c)Bridge rectifier	02
5	II	Draw R-C couple amplifier circuit and take print out	02
6	II	Draw the following oscillator circuit and take print out. (a)Hartley oscillator (b)Colpitt oscillator (c) Phase-Shift Oscillator (d) Wien Bridge Oscillator (e)Crystal Oscillator	06
7	III	Simulate three resistances in series circuit and find out voltage and current in each resistance .	02
8	III	Simulate the following circuits and find out voltage and current in each resistances. (a)Two resistances in parallel (b)Resistance and inductor in parallel	02
9	III	Simulate a given complex circuit having combination of series-parallel resistances and find out current and voltage across each resistor.(Students can use circuit which asked in exams of D.C. Circuits course.)	02
10	III	Simulate R-L series circuit and observe voltage wave forms across each component.	02
11	III	Simulate R-C series circuit and observe voltage wave forms across each component.	02
12	III	Simulate R-L-C series circuit and observe voltage wave forms across each component.	02
13	III	Simulate R-L parallel circuit and observe current wave forms across each component.	02
14	III	Simulate R-C parallel circuit and observe current wave forms across each component.	02
15	III	Simulate R-L-C parallel circuit and observe current wave forms across	02

		each component.	
16	III	Simulate star connection using resistors and observe voltage current relation of line and phase.	02
17	III	Simulate delta connection using resistors and observe voltage current relation of line and phase.	02
18	III	Simulate one switch one bulb house wiring diagram circuit.	02
19	III	Simulate stair case wiring circuit.	02
20	IV	Simulate single phase half-wave rectifier circuit.	02
21	IV	Simulate single phase full-wave rectifier circuit.	02
22	IV	Simulate single phase bridge rectifier circuit.	02
23	IV	Simulate single phase half-wave rectifier circuit.	02
24	IV	Simulate single phase half-wave rectifier circuit.	02
25	IV	Using CRO find out voltage across resistors.(simulation)	02
26	IV	Using CRO find out unknown frequency by comparing it with known frequency.	02
27	IV	Simulate basic logic gates.	02
28	IV	Using simulation prove that NAND gate is universal gate.	02
29	IV	Using simulation prove that NOR gate is universal gate.	02
30	IV	Using simulation prove De Morgan's theorem.	02
31	IV	Using simulation prove half adder and full adder circuit.	02
32	IV	Using simulation prove half subtractor and full subtractor circuit.	02
33	V	Develop P.C.B. layout for a given electrical circuit using software	04
34	V	Develop P.C.B. layout for a given electronics circuit using software	02
Total			**60**

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- Find appropriate soft ware on internet for given task.
- Calculate out put of given circuit theoretically and verify it in experiment.
- Do presentation in laboratory of simulation related to their previous semester and current semester circuit.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

10. SUGGESTED LEARNING RESOURCES

A) List of Books

S. No.	Title of Book	Author	Publication
1.	AutoCAD 2013 for Engineers & Designers.	Prof. Sham Tickoo	Dream tech press.

2.	Mastering AutoCAD 2013 and AutoCAD LT 2013	George Omura	Sybex
3.	Mastering electronics workbench : Version 5 and Multisim Version 6	John Adams	McGraw-Hill
4.	Introduction To PSpice Using OrCAD For Circuits And Electronics	Muhammad H. Rashid	PHI

B) List of Major Equipment/ Instrument with Broad Specifications

C) List of Software/Learning Websites

AutoCAD
Work bench
PSIM
SPICE (Simulation Program with Integrated Circuit Emphasis)……..
Orcad for pcb design…..
Circuit maker
Multi Sim
http://coolcadelectronics.com/coolspice/)
http://students.autodesk.com/ (register and get free student version of LATEST AutoCAD software for approximately 3 years)
http://www.circuitstoday.com/circuit-design-and-simulation-softwares
http://en.wikipedia.org/wiki/List_of_free_electronics_circuit_simulators
http://coolcadelectronics.com/coolspice/
Android applications available on Google Play store like AutoCAD 360, Circuit Builder, Electric Circuit, Circuit Simulator, WeSpice Demo, Electric Circuit Calculator, and Electrical Engineering

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- Prof. H.C.Chawda, RCTI, Sola Ahmedabad.
- Prof. R.D.Panchal, RCTI, Sola Ahmedabad.
- Prof. S.V.Jagani, Govt.Polytechnic, Dahod
- Prof. A.A.Amin, Govt. Polytechnic, Vadnagar

Coordinator and Faculty Members from NITTTR Bhopal

- Prof. (Mrs.) Susan S. Mathew
- Dr. Joshua Earnest,