GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: **D.C. Circuits**
(Code: **3320903**)

Diploma Programmes in which this course is offered	**Semester in which offered**
Electrical Engineering	**Second Semester**

1. RATIONALE

At the beginning of electrical engineering program, basic knowledge of principles and concepts of electrical parameters need to be developed in the students. The understanding of basic concepts of electrical engineering parameters will help in the next semester electrical engineering subjects. This will also be useful to analyze in different electrical and electronic engineering applications.

2. LIST OF COMPETENCIES

- Solve electrical Circuits using circuit laws and network theorems
- Energy conversion from electrical to non-electrical and vice versa

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			**Total Credits (L+T+P)**	**Examination Scheme**				
				Theory Marks		**Practical Marks**		**Total Marks**
2	2	2	**6**	70	30	20	30	150

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

4. DETAILED COURSE CONTENTS

Unit	**Major Learning Outcomes**	**Topics and Sub-topics**
Unit –I Introduction to electrical energy	1.1 Define the various electrical parameters 1.2 Identify the commonly used materials and components used in electrical engineering	• Sources of Electrical Energy; • Charge, Current, Potential , voltage, power, Energy Electrical Resistance and its unit.: Ohms law: applications and limitations Specific Resistance and its unit. Parameters affecting the resistance, Effect of temperature on resistance and temperature co-efficient, potential difference ; EMF • Conductors, Insulators , semiconductors, capacitors and inductors.

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit –II Electrical circuits	2.1 Interpret electrical circuits 2.2 Calculate different parameters of the electrical circuit 2.3 Describe Kirchhoffôs laws	• Open circuit, Closed circuit, Short circuits; • Series and Parallel circuits with numerical problems • Definitions of node, branch, loop ,mesh • Kirchhoffôs laws and simple numerical
Unit –III Network Theorems	3.1 Define types of electrical circuits 3.2 Use Super positionôs theorem 3.3 Use Thevininôs theorem 3.4 Use Nortonôs theorem 3.5 Use maximum power transfer theorem 3.6 Undertake star-delta and delta star transformations	• linear & nonlinear circuit, active and passive network • Super position theorem, Thevininôs theorem, Nortonôs theorems, Maximum power transfer theorem, • Star delta transformations with numericals
Unit –IV Electrostatics & Capacitors	4.1 Define the terms related to electrostatics 4.2 Explain the working of a capacitor 4.3 Identify the different types of capacitors and their applications 4.4 Calculate the required capacitance in electrical circuits 4.5 Calculate the energy stored in capacitors	• Electric charge, Laws of electrostatics, Electric field, Electrostatic induction Electric flux , Flux Density, Electric field Intensity • Capacitance ï Effects of Dielectrics, dielectric constant units • Types of Capacitors. Capacitors in series and parallel • Energy stored in a capacitor, Rise and decay of current in R-C Circuit and time constant
Unit –V Electromagnetic Induction& Inductors	5.1 Define phenomenon of electromagnetic induction 5.2 State and apply Faradayôs law, Lenzôs law, Flemingôs right hand rule, Flemingôs left hand rule 5.3 Differentiate Statically and dynamically induced EMF, self and mutual inductance 5.4 Identify the different types of inductor and explain their applications 5.5 Calculate the energy	• Electromagnetic Induction • Faradayôs law, Lenzôs law, Flemingôs right hand rule for generators , Flemingôs left hand rule for motors • Statically and dynamically induced EMF, • Inductance: Self and mutual inductance, • Types of inductor • Energy stored in magnetic field

Unit	Major Learning Outcomes	Topics and Sub-topics
	stored in magnetic field	
Unit –VI Work Power and Energy	6.1Define the terms work ,power and energy 6.2 Convert mechanical energy to electrical energy and electrical energy to mechanical energy . 6.3 State joules law and its applications.	• Definitions and units of Work, Power and Energy (both electrical and mechanical) • Conversion from Mechanical units into Electrical units, Problems. • Joules law of heat and problems on heatin

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks (Duration – …..Hours)			
			R Level	U Level	A Level	Total
1	Introduction to electrical energy	6	6	4	5	15
2	Electrical circuits	5	3	4	8	15
3	Network Theorems	5	3	4	8	15
4	Electrostatics & Capacitors	4	5	3	2	10
5	Electromagnetic Induction & Inductors	5	5	3	2	10
6	Work Power and Energy	3	2	1	2	05
		28	**24**	**19**	**27**	**70**

Legends:
R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloomôs taxomonoy

6. SUGGESTED LIST OF EXPERIMENTS

S. No.	Unit No.	Experiment/Tutorial	Hours suggested
1	1	Measure Voltage and Current in a given linear electrical circuit	02
2	1	Calculate Temperature Co-efficient of a given resistor	02
3	2	Connect Resistances in Series to get required effective resistance and verify	02
4	2	Connect Resistances in Parallel to get required effective resistance and verify	02
5	2	Connect Resistances in Parallel and series to get required effective resistance and verify	02
6	2	Measure current in a particular branch of the given electrical circuit using Kirchoffôs Current Law	02

7	2	Measure Voltage drop in a closed loop of the given electrical circuit using Kirchoffôs Voltage Law	02
8	3	Measure current in a particular branch of the given electrical circuit having two input sources using Superposition theorem	02
9	3	Verify Theviniôs theorem for a given circuit	04
10	3	Convert Star connected resistances to its equivalent Delta connected resistances and verify	02
11	3	Convert Delta connected resistances to its equivalent Star connected resistances and verify	04
12	4	Obtain equivalent capacitance by connecting given Capacitors in Series and Parallel and verify	02
		Total	28

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

- Preparing journals base on practical performed in laboratory.
- Assignments on solving numerical
- Identify and select various measuring instruments as per required range
- Identify and select resistors based on color code
- Identify and select capacitors based on color code
- Calculate RC Time constant for given R-C series circuit

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No.	Author	Title of Books	Publication
1	Theraja, B. L.	Electrical Technology Vol-1	S. Chand, 2011
2	Gupta, B.R.	Principles of Electrical Engineering	S.K. Kataria,2012
3	Rao, Uma. K.	Basic Electrical Engineering	Pearson ,2011
4	Murthy, R. S.	Basic Electrical Engineering	Pearson,2011
5	Gupta ,J.B.	A Course in Electrical Technology Vol. I	S.K. Kataria,2012
6	Singh, Tarlok	Fundamentals of Electrical Engineering	S.K. Kataria,2012

B. List of Major Equipment/ Instrument

- Ammeter, Voltmeter, Wattmeter, Multimeter, Stop watch, Thermometer
- Rheostats, Capacitors , Inductors

C. List of Software/Learning Websites:

- Electronic Work bench or Circuit maker
- **www. kpsec.freeuk.com**
- www.**howstuffworks**.com/

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

1.Prof. S.S.Mehta. Lecturer, Electrical engg.Dept. ,B&B Institute of Technology, Vallabhvidyanagar.

2. Prof. B. R. Shrotriya. Lecturer,Electrical engg.Dept. ,Govt. Polytechnic, Junagadh.

3. Prof. V. R. Kotdawala. Lecturer, Electrical engg. Dept. ,Govt. Polytechnic, Himmatnagar.

4. Prof. A.A. Parmar Lecturer, Electrical engg.Dept., B&B Institute of Technology, Vallabhvidyanagar.