FACULTY OF TECHNOLOGY & ENGINEERING
M & V PATEL DEPARTMENT OF ELECTRICAL ENGINEERING

EE145: BASICS OF ELECTRONICS & ELECTRICAL ENGINEERING

A. Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	0	5	4
Marks	100	50	0	150	

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Basic Electrical Terms and Units	04
2	Electrical Circuit Analysis	07
3	Electrostatic	08
4	Electromagnetism	05
5	AC Fundamentals	05
6	Single Phase AC Series Circuits	05
7	Polyphase Circuits	04
8	Basics of Electronics	07

Total hours (Theory) : 45 Hrs
Total hours (Lab) : 30 Hrs
Total hours : 75 Hrs

C. Detailed Syllabus

1	Basic Electrical Terms and Units	04 Hours	08%
1.1	Ohm's law, resistor and its coding, properties, temperature co- efficient of resistance, resistance variation with temperature, examples		
2	Electrical Circuit Analysis	07 Hours	15%
2.1	Kirchhoff's current and voltage law, mesh and nodal analysis, Examples		
2.2	Series parallel circuits, star-delta transformation		
3	Electrostatic	08 Hours	18%
3.1	Capacitors, charge and voltage, capacitance, electric fields, electric field strength and electric flux density, relative permittivity, dielectric strength, Examples		

3.2	Capacitors in parallel and series, Calculation of capacitance of parallel plate and multi plate capacitor, examples		
4	Electromagnetism	05 Hours	12%
4.1	Magnetic field, its direction and characteristics, magnetic flux and flux density, magneto motive force and magnetic field strength, examples		
4.2	Faraday's law of electromagnetic induction, Fleming's left hand and right hand rule, Lenz law, force on a current carrying conductor, examples		
4.3	Self and mutual inductance		
5	AC Fundamentals	05 Hours	12%
5.1	AC Waveform and definition of its terms, relation between speed and frequency		
5.2	Average and RMS value and its determination for sinusoidal wave shapes, examples		
6	Single Phase AC Series Circuits	05 Hours	12%
6.1	R–L and R-C series circuit, power in ac circuits, examples		
6.2	R-L-C series circuit, resonance in R-L-C series circuit, relevant examples		
7	Polyphase Circuits	**04 Hours**	**08%**
7.1	Phase sequence, voltage and current relations in star and delta connected system		
8	Basics of Electronics	**07 Hours**	**15%**
8.1	Electronic Systems: Basic amplifier, voltage, current and power gain, Basic attenuators, CRO		
8.2	Transmission and Signals: Analog and digital signals, bandwidth,		
8.3	Forward and reverse bias of PN junction diode, Zener diode		
8.4	Rectifiers: Half Wave, Full Wave - Centre Tap, Bridge		
8.4	Transistor: Bipolar junction transistor, construction and biasing, configuration		

D. Course Outcomes (COs):

On the completion of the course, one should be able to:

CO1:	Describe resistors, capacitors and inductors properties, readings and calculation
CO2:	State the basic electrical laws and apply these laws to solve electrical network.
CO3:	Identify the property of magnetic materials and understand the laws of emf generation
CO4:	Solve the series and parallel DC circuits and AC circuits for single and poly-phase networks
CO5:	Develop skill and design AC-DC rectification circuits, operate basic electrical and electronics instruments

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO2:	2	3	-	-	-	-	-	-	-	-	-	-	1	-
CO3:	1	3	-	-	-	-	-	-	-	-	-	-	1	-
CO4:	1	2	-	2	-	-	-	-	-	-	-	-	3	-
CO5:	1	2	3	-	3	-	-	-	-	-	-	-	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High), No correlation "-"

E. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, pre-requisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, blackboard, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

- **Recommended Study Material:**

❖ Text Books:

1. Elements of Electrical Engineering and Electronics by U.A.Patel and R. P. Ajwalia

2. A Text Book of Electrical Technology by B. L. Thareja, S. Chand
3. Principles of Electrical Engineering and Electronics by V. K. Mehta, S. Chand

❖ Reference Books:

4. Electrical Technology by Hughes, Pearson Education.
5. Electrical Engineering Fundamentals by Vincent Del Toro, Pearson Education.

❖ **Web Material**

1. https://www.electronics-tutorials.ws/