



# C.U.SHAH UNIVERSITY

**FACULTY OF** :-Technology and Engineering

**DEPARTMENT OF** :- CE/IT/EC/MECH/EEE/AUTO/IC/EE/CIVIL

**SEMESTER** :- I

**CODE** :- 4TE01FEE1

**NAME** –Fundamental of Electrical Engineering (FEE)

## Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE01FEE1	Fundamental of Electrical Engineering (FEE)	4	0	2	6	5	30	1.5	70	3	30	20	---	150

### Objectives:

- To acquaint the students in fundamental concepts of Electrical Engineering which includes various Engineering Standards, Basic Elements of Circuits and its properties, Basic of Energy Conversion, Various fundamentals and Laws governing the phenomena of Electromagnetism and Electrostatics.
- To impart training to the students in order to enable them to understand , analyze and evaluate various aspects of basic D.C. as well and A.C. Circuits like various connection topologies, measuring parameters, governing laws of circuits, voltage current relationship and various graphical representation of quantities of circuits.

### Prerequisites:

- History of discovery of Electrical Energy
- Electrical Concepts from Physics
- Calculus
- Complex Algebra

### Course outline:-

Sr. No	Content	Hours
01	<b>Fundamental and Basic Circuit Element</b> <ul style="list-style-type: none"> <li>Concepts of E.M.F., Potential Difference and current, Resistance and Resistors, effect of temperature on resistance, resistance temperature coefficient, resistors in series and parallel, S.I. units of work, power and energy.</li> </ul>	06
02	<b>Electromagnetism</b> <ul style="list-style-type: none"> <li>Magnetic effect of an electric current, cross and dot conventions, right</li> </ul>	08

	<p>hand thumb rule and cork screw rule, nature of magnetic field of long straight conductor, solenoid and toroid. Concept of m.m.f., flux, flux density, reluctance, permeability and field strength, their units and relationships. Simple series and parallel magnetic circuits, comparison of electrical and magnetic circuit, force on current carrying conductors placed in magnetic field, Fleming's left hand rule. Faradays laws of electromagnetic induction, statically and dynamically induced E.M.F., self and mutual inductance, coefficient of couplings. Energy stored in magnetic field. Charging and discharging of inductor and time constant.</p>	
03	<p><b>Electrostatics</b></p> <ul style="list-style-type: none"> <li>Electrostatics field, electric flux density, electric field strength, absolute permittivity, relative permittivity, capacitance and capacitor, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and time constant.</li> </ul>	08
04	<p><b>D.C. Circuits</b></p> <ul style="list-style-type: none"> <li>Classification of electrical networks, Ohm's law, Kirchhoff's law and their applications for network solutions. Simplifications of networks using series and parallel combinations and star-delta conversions.</li> </ul>	08
05	<p><b>AC Fundamentals</b></p> <ul style="list-style-type: none"> <li>Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak (maximum), average and R.M.S. values, frequency, cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors.</li> </ul>	08
06	<p><b>AC Circuits</b></p> <p><b>a) Single Phase AC Circuit :</b> Study of A.C. circuits consisting of pure resistance, pure inductance, pure capacitance and corresponding voltage-current phasor diagrams and waveforms. Development of concept of reactance, study of series R-L, R-C, R-L-C circuit and resonance, study of parallel R-L, R-C and R-LC circuit, concept of impedance, admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, concept of active, reactive and apparent power and power factor. Single Phase Power Measurement</p> <p><b>b) Poly Phase AC Circuit :</b> Poly phase A.C. Circuits: Concept of three-phase supply and phase sequence. Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams. Three Phase Power Measurement</p>	10
07	<p><b>Single Phase Transformer</b></p> <ul style="list-style-type: none"> <li>Construction, working principle, emf equation, transformation ratio, working of transformer on no load and with load, losses, efficiency and voltage regulation</li> </ul>	10

**Learning Outcomes:-**

- Student would be able to understand basic concept of Electrical Engineering, various Basic Circuit Elements, connection topologies and fundamental electrical circuits with various types of Load.

- The concepts of Electrical Engineering would be the foundation stone for students to study the advance concepts of Electrical Engineering and would also be useful in day to day application.

### **Books Recommended**

1. *Electrical Technology Vol.1*, **B.L.Theraja**, S.Chand Publication, New Delhi
2. *Basic Electrical Engineering*, **V.N.Mittal**, TMH Publication, New Delhi
3. *Basic Electrical Engineering*, **V.K.Mehta**, S.Chand and Company Ltd., New Delhi
4. *Electrical Technology*, **Edward Hughes**, Seventh Edition, Pearson Education
5. *Elements of Electrical Technology*, **H.Cotton**, C.B.S. Publications
6. *Basic Circuits Analysis*, **John Omalley Shawn**, Mc Graw Hill.
7. *Principles of Electrical Engineering*, **Del. Toro**, PHI