Enrollment No:-__________ Exam Seat No:-________

C.U.SHAH UNIVERSITY

Summer-2015

Subject Code: 4TE01FEE1 Subject Name: Fundamental Electrical Engineering

Course Name: B.Tech Date: 6/5/2015

Semester:I Marks: 70

Time:10:30 TO 01:30

Instructions:

1) Attempt all Questions of both sections in same answer book/Supplementary.
2) Use of Programmable calculator & any other electronic instrument prohibited.
3) Instructions written on main answer book are strictly to be obeyed.
4) Draw neat diagrams & figures (if necessary) at right places.
5) Assume suitable & perfect data if needed.

SECTION-I

Q -1 A. Define the following terms: 03

(1) Current (2) Potential (3) Electric Field Intensity.

B. State and explain Kirchoff's Laws. 04

Q-2 A. Explain Ohm's law, state its limitations. 05

B. State and explain Coulombs Laws of electrostatics. 05

C. The equivalent capacitance of two capacitors when connected in series is 0.03 μ F and when connected in parallel is 0.16 μ F. Find the capacitance of both the capacitors. 04

OR

Q-2 A. The resistance of a coil embedded in a large transformer is 12 Ohms at 25 ^{o}C. After the transformer has been in operation for several hours, the resistane of the coil is found to be 13.4 Ohms. Find the temperature of the transformer. Take $\alpha_{20} = 0.00393\ ^{0}C^{-1}$. 05

B. Derive the relation between mutual inductance and reluctance. 05

C. Derive the equation $C = \frac{\varepsilon_0 A}{\Sigma \frac{d}{\varepsilon_r}}$ for the parallel plate capacitor 04

Q-3 A. Obtain an expression for the equivalent star network resistance for a given delta network resistances. 07

B. Derive the expression of inductance for the coupled coil connected in series. 07

OR

Q-3 A. An iron ring having a cross sectional area of 5 cm x 4 cm, a mean diameter of 18 cm has a coil of 270 turns uniformly wounded over it. A current of 1.27 A flows through the coil which produces a flux of 1.13 mWb in the ring. Find the reluctance of the circuit, the absolute permeability of Iron. 07

B. Derive the expression for Energy stored in a charged capacitor. 07

SECTION-II

Q -4 A. Define following terms with respect to A.C. waveform 04
(i) R.M.S. value (ii) Power factor
(iii) Peak factor (iv) Form Factor

B. Draw the clear A.C. waveform. Lable time period, X and Y axes for voltage and time, and peak to peak values. 03

Q-5 A. Prove that current in pure inductive circuit lags its voltage by 90^0 05

B. Give the advantages of three phase system over single phase system. 05

C. Find the capacitance which must be connected in seires with a 100 W, 110 V lamp inorder that the lamp may draw its normal current when the combination is connected to a 230 V , 50 Hz supply. 04

OR

Q-5 A. Prove that for purely capacitive circuit current be leading 90^0 to applied voltage. 05

B. What are the various electrical losses in a transformer? Explain them. 05

C. An alternating current having an equation I =60sin314t. 04
Find: (i) Maximum value of current (ii) Frequency

Q-6	A.	A voltage of 125 V at 50 Hz is applied across a non inductive resistor connected in series with a condenser. The current in the circuit is 2.2 A the power loss in the resistor is 96.8 W and that in condenser is negligible. Calculate the values of resistances and capacitances.	07
	B.	Explain the working principle and construction of a transformer.	07

OR

Q-6	A.	Calculate 1) form factor 2) peak factor of a full wave rectified sine wave.	07
	B.	Prove that RMS value of a sinusoidal current is 0.707 I_m .	07