Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name: Fundamental of Electrical Engineering

Subject Code: 4TE01FEE1 **Branch: B.Tech (All)**

Semester: 1 **Date: 30/11/2018** **Time: 02:30 To 05:30** **Marks: 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

1) Unit of charge is _____

A) Ampere B) Coulomb C) Joule D) Volt

2) Resistance of metalic conductor is proportional to its length.

A) True B) False

3) Unit of resistivity is_____

A) Weber B) Ohm C) Ohm-metre D) Ohm/metre

4) The unit of permeability is _____.

A) Henry/Metre B) Weber C) Henry D) Metre/ Henry

5) If the distance between the plate of capacitor incerases, its capacitance_____

A) Increases B) Remains constant C) Decreases D) None of the above

6) Which one of the below is not a valid formula?

A) $V = \frac{Q}{C}$ B) $C = \frac{Q}{V}$ C) $Q = CV$ D) $C = \frac{V}{Q}$

7) The average value of a sine wave over a full cycle is _____.

A) 0.707 B) 0 C) 0.636 D) 0.318

8) The ratio of rms. value to average value is called peak factor.

A) True B) False

9) If $e_1 = A\sin\omega t$ and $e_2 = B\sin(\omega t + \phi)$, then

A) e_1 leads e_2 by ϕ B) e_2 lags e_1 by ϕ C) e_2 leads e_1 by ϕ D) e_1 is in phase with e_2

10) In a purely inductive circuit, voltage across inductor leads the current by_____

A) 45° B) 180° C) 90° D) 30°

11) The average power consumed by a purely capacitve circuit is zero.

A) True B) False

12) In a balanced 3-phase star connected system, the equation for three phase power is given by_____

A) $V_{ph}I_{ph}\cos\phi$ B) $2V_{ph}I_{ph}\cos\phi$ C) $3V_{ph}I_{ph}\cos\phi$ D) $\sqrt{3}V_{ph}I_{ph}\cos\phi$

13) A transformer is a _____equipment.

A) Rotating B) Static C) Both rotating and static D) None of the above

14) For a step down transformer, transformation ratio K is _____

A) >1 B) =1 C) =0 D) < 1

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions (14)

(a) Derive an expression of equivalent resistance for *'n'* number of resistances connected in series. Give the advantages of series connection. **07**

(b) Explain the effect of temperature on the resistance of the following. **07**

i) Pure metals ii) Semiconductors

iii) Electrolytes iv) Insulators

Q-3 Attempt all questions (14)

(a) State Faraday's first law and second law electromagnetic induction. Derive the equation of induced emf $e = N\frac{d\phi}{dt}$. Where N= Number of turns in a coil, ϕ = flux in the coil. **07**

(b) Give any seven comparisons between magnetic circuit and electrical circuit. **07**

Q-4 Attempt all questions (14)

(a) Define capacitance. Derive an expression of total capacitance for *n* number of capacitors when connected in parallel. **07**

(b) Derive the expression for the energy $E = \frac{1}{2}CV^2$ stored in a charged capacitor. where C is the capacitance and V is the voltage across the capacitor. **07**

Q-5 **Attempt all questions** **(14)**

(a) Obtain an expression for the equivalent star network resistance for a given delta network. **07**

(b) State and explain Ohm's law. Give its limitations. **07**

Q-6 **Attempt all questions** **(14)**

(a) Explain the following terms with diagrams for sinusoidal AC quantities. **07**

i) In-phase ii) Lagging iii) Leading

(b) An alternating e.m.f. is represented by e=200sin314t volt. Determine **07**

i) Maximum value ii) Frequency in Hertz iii) Time Period iv) Angular Frequency

Q-7 **Attempt all questions** **(14)**

(a) Explain the two wattmeter method for the measurement of power for a balanced three phase circuit. **07**

(b) Derive the relationship between the voltage and current for purely resistive AC circuit. Draw the waveforms and phasor diagram for voltage and current. **07**

Q-8 **Attempt all questions** **(14)**

(a) Derive the emf equation $e = 4.44 fN\phi_m$ for a single phase transformer Where f= frequency of supply, N= number of turns either primary or secondary side, ϕ_m = maximum flux in the core. **07**

(b) A single phase transformer has 400 primary turns 1000 secondary turns. The net cross-sectional area of the core is 60 cm^2. If the primary winding to be connected to a 50 Hz supply at 520 V (rms), Calculate, **07**

i) Peak value of the flux density in the core

ii) Voltage induced in the secondary winding.