Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2020

Subject Name: Fundamental of Electrical Engineering

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

Semester : 1 Date : 28/02/2020 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 resistivity is_____

A) ohm-meter B) ohm/meter C) meter/ohm D) ohm/meter^2

2) Which one of the below material has highest resistance?

A) Conductors B) Insulators C) Electrolytes D) Semiconductor

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

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

4) When four capacitors of 1µF are connected in parallel, the resultant capacitance will be _____

A) 1 µF B) 0.25 µF C) 0.50 µF D) 4 µF

5) The energy stored in magnetic field of inductor is given by the expression_____

A) 0.5 (L i)^2 B) 0.5 Li^2 C) Li D) 2Li^2

6) The unit of permeability is _____.

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

7) Flux of a magnetic circuit is analogous to _____

A) Electric Field Intensity B) Current density C) Electric current D) Resistance

8) Three resistance of 10 Ω are connected in star fashion, for equivalent delta connection, resistance of each side will be _____

A) 30 Ω B) 3.33 Ω C) 10 Ω D) 20 Ω

9) In case of sinusoidal voltage if V_{rms} is the rms voltage and V_m is the maximum voltage, then V_{rms} =_____

A) V_m B) $\frac{V_m}{2}$ C) $\frac{3V_m}{2}$ D) $\frac{V_m}{\sqrt{2}}$

10) For a purely inductive AC circuit, inductor current leads the supply voltage by 90 degree angle.

A) True B) False

11) At higher frequencies, the value of inductive reactance_____

A) Decreases B) Remains same C) Increases D) Depends on applied voltage

12) In a series R-L-C circuit, at resonance current is maximum.

A) True B) False

13) A transformer operates_____

A) On DC supply only B) On AC supply only C) Both AC and DC supply

14) A transformer transforms_____

A) Voltage and Current B) Voltage C) Current D) Frequency

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

Q-2 **Attempt all questions** **(14)**

(a) Explain the effect of temperature on resistance for the given materials. **07**

i) Pure Metals ii) Alloys iii) Insulators and Semiconductors

(b) Derive an expression for *'n'* number of resistances connected in parallel. Give the advantages of parallel connection. **07**

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) Derive the equation of flux $\phi = \frac{NI}{S}$ for a magnetic circuit. Where, **07**

I= Current through the magnetic circuit.

N= Number of turns in a magnetic circuit.

S= Reluctance of the magnetic circuit.

Q-4 **Attempt all questions** **(14)**

(a) Explain the action of a capacitor and derive the equation for the capacitance $C = \frac{Q}{V}$. **07**

(b) Derive an expression for the equivalent capacitance for a number of capacitors connected in **07**

Series ii) Parallel

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

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

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

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

(a) Draw the power triangle. From the power triangle define **07**

i) Active power ii) Reactive power iii) Apparent power iv) Power factor

(b) Explain the following sinusoidal function terminology. **07**

i) Amplitude ii) Angular Frequency iii) Time period

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

(a) For a three phase star connected balance system, Derive the relation between **07**

i) Phase Voltage and Line Voltage

ii) Phase Current and Line Current

(b) Give various wattmeter methods for measuring power in three phase circuits and explain any one of them. **07**

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

(a) Explain the theory of an ideal transformer. Explain the construction of core type transformer. **07**

(b) Derive the emf equation $e = 4.44 f N \phi_m$ 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**