

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

- 1) Unit of resistivity is _____
A) ohm-meter B) ohm/meter C) meter/ohm D) ohm/meter²
- 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 increases, its capacitance _____
A) Increases B) Remains constant C) Decreases D) None of the above
- 4) When four capacitors of $1\mu\text{F}$ are connected in parallel, the resultant capacitance will be _____
A) $1\mu\text{F}$ B) $0.25\mu\text{F}$ C) $0.50\mu\text{F}$ D) $4\mu\text{F}$
- 5) The energy stored in magnetic field of inductor is given by the expression _____
A) $0.5(Li)^2$ B) $0.5Li^2$ 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 10Ω are connected in star fashion, for equivalent delta connection, resistance of each side will be _____
A) 30Ω B) 3.33Ω C) 10Ω D) 20Ω



- 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
Series ii) Parallel **07**

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
i) Active power ii) Reactive power iii) Apparent power iv) Power factor **07**
- (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
i) Phase Voltage and Line Voltage
ii) Phase Current and Line Current **07**
- (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**

