

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/meter<sup>2</sup>
- 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 $\mu$ F are connected in parallel, the resultant capacitance will be \_\_\_\_\_  
A) 1  $\mu$ F      B) 0.25  $\mu$ F      C) 0.50  $\mu$ F      D) 4  $\mu$ F
- 5) The energy stored in magnetic field of inductor is given by the expression \_\_\_\_\_  
A) 0.5 (Li)<sup>2</sup>      B) 0.5 Li<sup>2</sup>      C) Li      D) 2Li<sup>2</sup>
- 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  $\Omega$  are connected in star fashion, for equivalent delta connection, resistance of each side will be \_\_\_\_\_  
A) 30  $\Omega$       B) 3.33  $\Omega$       C) 10  $\Omega$       D) 20  $\Omega$



- 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,  $\phi$  = 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,  $\phi_m$  = maximum flux in the core.            **07**

