

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Winter Examination-2020

Subject Name: Fundamental of Electrical Engineering

Subject Code: 4TE01FEE1

Branch: B.Tech (All)

Semester: 1

Date: 10/03/2021

Time: 03:00 To 06:00

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) The statement for Kirchhoff's Voltage law is represented by\_\_\_\_\_  
A)  $V_1 + V_2 + V_3 = 0$                       B)  $R_1 + R_2 + R_3 = 0$   
C)  $I_1 + I_2 + I_3 = 0$                       D) None of the above
- 2) The element responsible for the flow of electrons in the circuit is\_\_\_\_\_  
A) Switch      B) Battery      C) Both of them      D) None of above
- 3) Unit of resistivity is\_\_\_\_\_  
A) Weber      B) Ohm      C) Ohm-metre      D) Ohm/metre
- 4) Current is defined as \_\_\_\_\_  
A) Rate of Flow of Atoms                      B) Rate of Flow of protons  
C) Rate o Flow of Electrons                      D) All of above
- 5) Which one of the below element consume the energy?  
A) Resistor    B) Inductor    C) Capacitor    D) None of 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



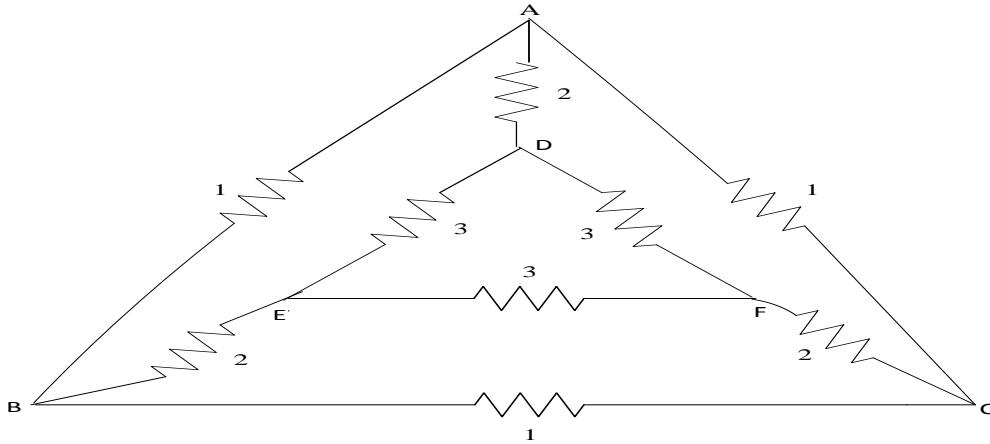
- 9) Which one of the below element is also known as current source?  
 A) Battery    B) Analog meters    C) Inductor    D) None of above
- 10) The peak value of sine wave is 100 V. Its rms value is \_\_\_\_\_  
 A) 63.7 V    B) 141.4 V    C) 100 V    D) 70.71 V
- 11) When four capacitors of  $0.25\mu\text{F}$  are connected in series , the resultant capacitance will be \_\_\_\_\_  
 A)  $1\mu\text{F}$     B)  $0.125\mu\text{F}$     C)  $0.0625\mu\text{F}$     D)  $4\mu\text{F}$
- 12) Which one of the below material has highest resistance?  
 A) Conductors    B) Insulators    C) Electrolytes    D) Semiconductor
- 13) A transformer is a \_\_\_\_\_equipment.  
 A) Rotating    B) Static    C) Both rotating and static    D) None of the above
- 14) A wave completes one cycle in  $10\mu\text{s}$ . Its frequency will be \_\_\_\_\_  
 A) 10 Hz    B) 50 Hz    C) 10 KHz    D) 100 KHz

**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) State and explain Ohm's law. Give its limitations    **07**
- Q-3    Attempt all questions    (14)**  
 (a) State and explain:    i) Kirchoff's Current Law    ii) Kirchoff's Voltage Law    **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**  
 Derive the relationship between the voltage and current for purely resistive AC circuit.    **07**  
 (b) Draw the waveforms and phasor diagram for voltage and current.    **07**
- Q-5    Attempt all questions    (14)**  
 (a) Obtain an expression for the equivalent star network resistance for a given delta network.    **07**  
 (b) A network of 9 conductors connected A, B, C, D, E, F as shown in figure. Determine the    **07**



resistance between A and B.



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

- (a) Derive the equation for calculating average value of AC current.
- (b) Derive the relationship between the voltage and current for purely inductive AC circuit. Draw the waveforms and phasor diagram for voltage and current.

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

- (a) Explain the following sinusoidal function terminology. **07**
- i) Amplitude    ii) Angular Frequency    iii) Time period
- (b) Derive the relationship between the voltage and current for AC series R-C circuit. Draw the waveforms and phasor diagram for voltage and current. **07**

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

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

- (b) For a series RLC circuit, derive the equation for series resonance **07**
- frequency  $f = \frac{1}{2\pi\sqrt{LC}}$ .

