

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.
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**Q-1 Attempt the following questions:**

**(14)**

- 1) Unit of charge is \_\_\_\_\_  
A) Ampere      B) Coulomb      C) Joule      D) Volt
- 2) Resistance of metallic 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 increases, 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  $\phi$       B)  $e_2$  lags  $e_1$  by  $\phi$       C)  $e_2$  leads  $e_1$  by  $\phi$       D)  $e_1$  is in phase with  $e_2$



- 10) In a purely inductive circuit, voltage across inductor leads the current by\_\_\_\_\_
- A)  $45^\circ$     B)  $180^\circ$     C)  $90^\circ$     D)  $30^\circ$
- 11) The average power consumed by a purely capacitive 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)  $2 V_{ph} I_{ph} \cos \phi$     C)  $3 V_{ph} I_{ph} \cos \phi$     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,  $\phi$  = 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. **07**
- where C is the capacitance and V is the voltage across the capacitor.



- 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**
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- 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  $e=200\sin314t$  volt. Determine      **07**  
       i) Maximum value    ii) Frequency in Hertz    iii) Time Period    iv) Angular Frequency
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- 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**
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- 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,  $\phi_m$  = 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  $60 \text{ cm}^2$ . 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.

