

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

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

**C.U.SHAH UNIVERSITY**  
**Summer Examination-2018**

**Subject Name: Fundamental Electrical Engineering**

**Subject Code: 4TE01FEE1**

**Branch: B.Tech (All)**

**Semester: 1**

**Date: 23/03/2018**

**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) The unit of an energy is\_\_\_\_\_  
A) Joule          B) Watt          C) Joule/seconds          D) None of the above
- 2) The resistance of metallic conductor is inversly propotional to its\_\_\_\_\_  
A) Length          B) Square of the length          C) Area          D) Square of the Area
- 3) The unit of permittivity is\_\_\_\_\_  
A) metre/Farad          B) Farad/metre          C) Farad          D) Farad-metre
- 4) When four capacitors of  $1\ \mu\text{F}$  are connected in parallel , the resultant capacitance will be \_\_\_\_\_  
A)  $0.5\ \mu\text{F}$           B)  $2\ \mu\text{F}$           C)  $0.25\ \mu\text{F}$           D)  $4\ \mu\text{F}$
- 5) A capacitor stores  $2\ \mu\text{C}$  charge at  $10\ \text{V}$ , its capacitance is \_\_\_\_\_  
A)  $2\ \text{F}$           B)  $0.2\ \mu\text{F}$           C)  $5\ \mu\text{F}$           D)  $10\ \mu\text{F}$
- 6) Flux of a magnetic circuit is analogous to \_\_\_\_\_  
A) Electric Field Intensity          B) Current density          C) Electric current          D) Resistance
- 7) The unit of reluctance is \_\_\_\_\_  
A) Ampere-Turns/Weber          B) Tesla          C) Weber          D) Ampere-Tesla



- 8) 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)  $\frac{V_m}{\sqrt{2}}$
- 9) The relation between angular velocity and frequency of an alternating quantity is given by\_\_\_\_\_
- A)  $\omega = \frac{f}{2\pi}$       B)  $\omega = 2\pi f$       C)  $\omega = \frac{2\pi}{f}$       D)  $\omega = \frac{2f}{\pi}$
- 10) If the frequency of an alternating current is 200 kHz, its time period will be\_\_\_\_\_
- A)  $10\mu s$       B)  $20\mu s$       C)  $15\mu s$       D)  $5\mu s$
- 11) In a series R-L-C circuit, at resonance current is maximum.
- A) True      B) False
- 12) A circuit of with unity power factor behaves as \_\_\_\_\_ circuit.
- A) A resistive      B) An inductive      C) A capacitive      D) None of the above
- 13) A transformer having 1000 primary turns is connected to a 250 V AC supply. For a secondary voltage of 400 V, the number of secondary turns should be\_\_\_\_\_
- A) 400      B) 250      C) 1600      D) 1250
- 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) Explain the effects of temperature on resistance of pure metals, alloys, insulators and semiconductors. **07**
- (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 of 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 **07**



the coil.

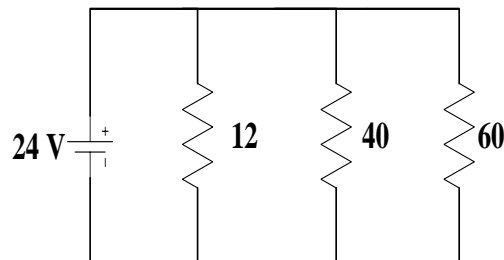
- (b) Derive the mathematical expression for co-efficient of coupling  $K = \frac{M}{\sqrt{L_1 L_2}}$  for magnetically coupled coils. Where  $L_1$  = self-inductance of coil 1,  $L_2$  = self-inductance of coil 2, and  $M$ =mutual inductance between two coils 07

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

- (a) Derive an expression for 'n' number of capacitance connected in series. 07
- (b) The total capacitance of two capacitors is 0.03 Farad when joined in series and 0.16 Farad when connected in parallel. Find the capacitance of each capacitor 07

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

- (a) Obtain an expression for the equivalent delta network resistance for a given star network 07
- (b) For the circuit given below, find its equivalent resistance and current through each resistance. 07



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

- (a) Explain the following sinusoidal function terminologies. 07
- i) Amplitude    ii) Instantaneous Value    iii) Time period and Frequency
- (b) An alternating emf is represented by  $e = 200 \sin 314t$  Volt. Determine 07
- i) Maximum Value    ii) Frequency    iii) Time Period    iv) Angular Frequency

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

- (a) For a three phase star connected balanced system, derive the relation between 07
- i) Phase Voltage and Line Voltage
- ii) Phase Current and Line Current



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

- (a) For a series RLC circuit, derive the equation for series resonance frequency **07**

$$f = \frac{1}{2\pi\sqrt{LC}}$$

- (b) Derive the emf equation  $e = 4.44fN\phi_m$  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**

