

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, ϕ = flux in **07**



the coil.

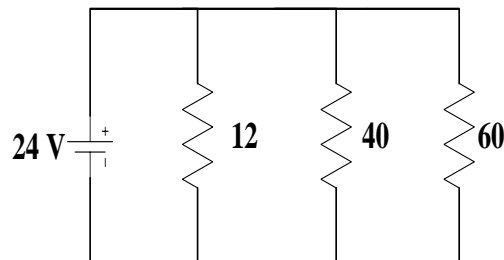
- (b) Derive the mathematical expression for co-efficient of coupling $K = \frac{M}{\sqrt{L_1 L_2}}$ for magnetically coupled coils. Where L_1 = self-inductance of coil 1, L_2 = self-inductance of coil 2, and M =mutual inductance between two coils 07

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, ϕ_m = maximum flux in the core. **07**

