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.

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 metalic 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 µF are connected in parallel , the resultant capacitance will be _____

A) 0.5 µF B) 2 µF C) 0.25 µF D) 4 µF

5) A capacitor stores 2 μC charge at 10 V, its capacitance is _____

A) 2 F B) 0.2 µF C) 5 µF D) 10 µF

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)10μs B) 20μs C) 15μs D) 5μs

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)

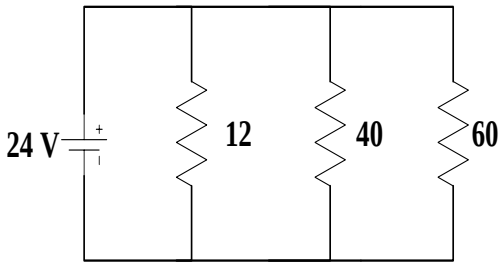
(a) Derive an expression for *'n'* number of capacitance connected in series. **07**

(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 resitance 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 $f = \frac{1}{2\pi\sqrt{LC}}$. **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, ϕ_m = maximum flux in the core. **07**