Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– 1st / 2nd EXAMINATION (NEW SYLLABUS) – WINTER 2018

Subject Code: 2110005   **Date: 18/01/2019**
Subject Name: Elements of Electrical Engineering
Time: 10:30am to 01:00pm   **Total Marks: 70**
Instructions:
1. **Question No. 1 is compulsory. Attempt any four out of remaining Six questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

		Mark
Q.1	**Objective Question (MCQ)**	
(a)		**07**

1. A kilowatt hour is the unit of
   [a] Energy   [b] power   [c] electric charge   [d] electric current
2. An ideal voltage source should have
   [a] zero internal resistance   [b] infinite source resistance
   [c] large value of e.m.f.   [d] low value of e.m.f.

3. A wave completes one cycle in 10 µs. Its frequency will be
   [a] 10µHz   [b] 50 Hz   [c] 100 KHz   [d] 10 KHz
4. If a pure capacitance is connected to an a.c. source, the current _____ the source voltage by _____
   [a]Lags, 90^0 [b] lags, 45^0 [c] leads,90^0 [d] leads, 45^0
5. When two capacitors of 6µF and 12µF are connected in series, their effective value will be
   [a] 18 µF   [b] 6 µF   [c] 4 µF   [d] µF
6. An R-L circuit has a resistance of 3 ohms and a reactance of 4 ohms. The impedance of the circuit is
   [a]5 ohms   [b] 7 ohms   [c] 1 ohm   [d] 25 ohms
7. The total lumens emitted by a source of 1 candela are equal to
   [a]0.4π   [b] 4π   [c] 2π   [d] 8π

(b)		**07**

1. A network which does not have either voltage source or current source is called
   [a] Active network   [b] Passive network
   [c] Resistive network   [d] Dummy network
2. Conductivity is analogous to
   [a]Flux   [b] reluctance   [c] permeance   [d] current
3. Tesla is the unit of
   [a]Flux density [b] flux   [c] magnetic field strength [d] reluctance
4. The value of form factor is
   [a] 11.1   [b] 1.11   [c] 1.414   [d] 14.14
5. The area of hysteresis loop is a measure of
   [a] magnetic flux   [b] permeance
   [c] mmf per cycle   [d] energy loss per cycle
6. The conjugate of the complex quantity (4-j5) will be
   [a] -4-j5   [b] 4-j5   [c] -4+j5   [d] 4+j5
7. The power factor of R-C series a.c. circuit is
   [a] unity   [b] lagging   [c] leading   [d] zero

Q.2	**(a)**	State and explain Kirchoff's voltage and current laws.	**03**
	(b)	Define & explain temperature co-efficient of resistance.	**04**
	(c)	Derive the equations to translate a passive electric circuits from star network to delta network configuration with diagram.	**07**

Q.3	**(a)**	Derive the expression for the equivalent capacitance of capacitors connected in parallel.	**03**
	(b)	Find out the equation for energy stored in capacitor.	**04**
	(c)	The total capacitance of two capacitors is 0.03 F when joined in series and 0.16 F when connected in parallel. Find the capacitance of each capacitor.	**07**

Q.4	**(a)**	State and explain faraday's laws of electromagnetic Induction.	**03**
	(b)	Give similarities and dissimilarities between electrical circuit and magnetic circuit.	**04**
	(c)	Derive the equation of coefficient of coupling of magnetically coupled coils.	**07**

Q.5	**(a)**	Explain magnetic hysteresis.	**03**
	(b)	A certain waveform has a form factor of 1.2 and a peak factor of 1.5. If the maximum value is 100, find the r.m.s. value and the average value.	**04**
	(c)	Prove the condition of resonance for series R-L-C a.c. circuit. Also analyze the phenomena with the help of graph.	**07**

Q.6	**(a)**	Explain in brief the following for 3-phase AC circuit: Phase sequence, Line voltage, Phase voltage	**03**
	(b)	Two circuits, the impedances of which are given as Z1=(10+j15)ohms and Z2=(6-j8) ohms are connected in parallel. If the total current supplied is 15A, what is power taken by each branch?	**04**
	(c)	Explain in brief power measurement using two wattmeter method in 3-phase system with star connected load.	**07**

Q.7	**(a)**	List the different types of illumination scheme.	**03**
	(b)	Discuss the types of cables used for residential and commercial wiring.	**04**
	(c)	List the different types of lamp and explain florescent lamps with wiring diagram.	**07**

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