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

## **C.U.SHAH UNIVERSITY Summer Examination-2019**

	Subject Subject Semest	t Name: Fundamental of Electrical t Code: 4TE01FEE1 er: I Date: 16/03/2019	Engineering Branch: B.Te Time: 02:30	ech (All) Fo 05:30	Marks: 70			
	<ul> <li>Instructions:</li> <li>(1) Use of Programmable calculator &amp; any other electronic instrument is prohibited.</li> <li>(2) Instructions written on main answer book are strictly to be obeyed.</li> <li>(3) Draw neat diagrams and figures (if necessary) at right places.</li> <li>(4) Assume suitable data if needed.</li> </ul>							
Q-1		Attempt the following questions:				(14)		
	1)	The resistivity of the conductor dependent of th	ends onof the	conductor. D) None of	these			
	2)	Resistance of metalic conductor is _ A) Directly B) Inversly	propotion	al to its area.				
	3)	How many coulombs of charge flow 1 minute? A) 10 B) 600 C)	6000 D) 1	rying a curren 200	t of 10 A in			
	4)	The unit of permeability isA) Henry/Metre B) Weber	 C) Henry D)	Metre/ Henry				
	5)	A capacitor carries a charge of 0.1 C A) 0.2 F B) 0.5 F C	at 5 V. Its capacitance ) 0.05 F D) 0	e is 0.02 F				
	6)	To obtain a high value of capacitand be A) Low B) Zero C) D	ee, the permittivity of High D) Unity	dielectric med	lium should			
	7)	If a pure inductor is connected across inductor isWatt A) A few B) Zero	s the ac source, the av	verage power t Maximum	aken by the			
	8)	The peak value of sine wave is 100 A) 63.7 V B) 141.4 V	V. Its rms value is C) 100 V D) 7	0.71 V				
	<b>9</b> )	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)	At higher frequencies, the value of capacitive reactance						
		A) Decreases B) Remains same C) Increases D) Depends on applied voltage						
	11)	In series RLC circuit what is the power factor just below the resonance frequency?						
		A) Lagging B) Leading C) Unity D) Zero						
	12)	In a balanced 3-phase delta connected system, Line voltage is equal to Phase						
		Voltage.						
		A) True B) False						
	13)	A transformer transforms						
		A) Voltage B) Current C) Frequency D) Voltage and Current						
	14)	For a step up transformer, transformation ratio K is						
		A) $=0$ B) >1 C) $=1$ D) < 1						
Attem	pt any	v four questions from Q-2 to Q-8	(1.4)					
Q-2	(a)	Attempt all questions Define temperature co-efficient of resistance. Prove that $\alpha_{\star} = -\frac{\alpha_0}{\alpha_0}$ , where $\alpha_0 = -\frac{\alpha_0}{\alpha_0}$	(14) 07					
		$1 + \alpha_0 t'$						
		temperature co-efficient of resistance at $0^{\circ}$ C.						
	(b)	Explain the effect of temperature on the resistance of the following.	07					
		1) Pure metals   11) Semiconductors     iii) Electrolater   iiii) Levelaters						
		111) Electrolytes 1V) Insulators						
0-3		Attempt all questions	(14)					
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	(a)	State Faraday's first law and second law electromagnetic induction. Derive the	07					
		equation of induced emf $e = N \frac{d\phi}{dt}$ . Where N= Number of turns in a coil, $\phi$ = flux in						
		the coil.						
	<b>(b</b> )	Derive the expression of inductance for the coupled coil connected in series	07					
Q-4		Attempt all questions	(14)					
	(a)	Define capacitance. Derive an expression of total capacitance for $n$ number of	07					
		capacitors when connected in series.						
			<b>.</b> –					

(b) Derive the expression of energy  $E = \frac{1}{2}CV^2$  stored in a electric field of the capacitor. Where, C=capacitance of capacitor, V= Voltage across the capacitor.



Q-5		Attempt all questions	(14)
	(a)	Obtain an expression for the equivalent delta network resistance for a given star network.	07
	(b)	State and explain Kirchhoff's current and voltage law.	07
Q-6	(a)	Attempt all questions Derive the relationship between the voltage and current for purely inductive circuit.	(14)
		Draw the waveforms and phasor for voltage and current.	
	<b>(b)</b>	Define resonance. Derive the expression of the resonance frequency for the series	
		RLC cicuit.	
Q-7	(a)	Attempt all questions Explain the two wattmeter method for the measurement of power for a balanced	(14) 07
		three phase circuit.	
	( <b>b</b> )	Derive the following relation for 3 phase balanced star connection.	07
		i) Relation between line voltage and phase voltage	
		ii) Relation between line current and phase current	
Q-8	(a)	Attempt all questions Derive the emf equation $e = 4.44 f N \phi_m$ for a single phase transformer Where f=	(14) 07
		frequency of supply, N= number of turns either primary or secondary side, $\phi_m =$	
		maximum flux in the core.	

(b) A single phase transformer has 400 primary turns 1000 secondary turns. The net 07 cross-sectional area of the core is 60 cm<sup>2</sup>. If the primary winding to be connected to a 50 Hz supply at 520 V (rms), Calculate,

- i) Peak value of the flux density in the core
- ii) Voltage induced in the secondary winding.

