

MODEL QUESTION PAPER

Subject code & Name: 2110005 - Elements of Electrical Engineering

Remembrance based sample questions		
<i>Question No</i>	<i>Question Description</i>	
A1	Recall the classical laws of electrical science, citing an example for each.	Kirchhoff's voltage law
A2		Kirchhoff's current law
A3		Fleming's Left-hand & Right-Hand Rule
A4		Lenz's Law
A5		First & Second law of electrostatic
A6		Faraday's law of electromagnetic Induction
A7	Recall the definitions of the technical terms with reference to Electrical Quantity/Parameters in AC Electric Circuits.	Average AC value
A8		R.M.S Value
A9		Form Factor
A10		Peak Factor
A11	Recall the definitions of the following terms and mention their SI units.	Electrical Permittivity
A12		Electrical Potential & Potential difference
A13		Magneto motive force

Understanding based sample questions	
Question no	Question description
B1	Devise a sequence to translate a passive electric circuit from Star network configuration to a Delta network configuration.
B2	Derive expression for co-efficient of mutual coupling between two coils having self inductances of L1 and L2.
B3	Derive the mathematical steps to prove that the average power consumption in a pure inductive circuit is zero.
B4	Recall the condition of resonance in passive series electrical circuit (R-L-C) powered by a variable frequency source. Also represent the phenomena in a graph.
B5	Conceptualize and elaborate pipe earthing and showcase in a diagram.
B6	Conceptualize and elaborate fuel cell with suitable diagram.
B7	In a balanced three phase delta connection discover the relationship between the following: 1. Line Voltage and Phase Voltage 2. Line Current and Phase Current Note: Draw suitable Phasor diagrams.
B8	In three phase circuit with star connected load, measure the input power using the Dztwo wattmeterdz method.

Application and Analysis sample questions	
Question no	Question description
C1	It is required to find the ratio of specific resistances associated with two wires with the following attributes (data) : 1. Two wires, A & B are connected in parallel 2. Conductivity of wire A is different as compared to of wire B 3. The current flow ratio between A & B is 5:6. 4. Length of wire A = $1.7 * B$ 5. Cross section of wire A = $2 * B$
C2	A high voltage system utilizes a capacitor as one of its circuit components. The capacitor is constructed by utilizing three stacks of dielectric layers. It is proposed to calculate the equivalent capacitance and electric stress associated with each of the dielectric layers of the capacitor. The said capacitor is powered with 1000 volts source. The other details about the capacitor is as given below: 1. Area of capacitor plates: 2 m^2 2. Relative permittivity of the layers: Layer-1: 2 Layer-2: 3 Layer-3: 6 3. Thickness of the layers Layer-1: 0.4 mm Layer-2: 0.6 mm Layer-3: 1.2 mm
C3	In electric circuit a capacitor in series with a resistor is suddenly introduce across a DC supply. The following are the values associated with the circuit

	<p>elements:</p> <p>Capacitor = 50 micro Farad</p> <p>Resistor = 100 ohms</p> <p>DC Supply = 100 volts</p> <p>Calculate the following parameter based data given above and the circuit condition mentioned:</p> <p>(1) Time constant of the circuit</p> <p>(2) Initial Current</p> <p>(3) Current Equation as a function of time</p> <p>(4) Voltage across resistor after 6 m.sec.</p>
C4	<p>A system of inductors connected in parallel is such that the mutually induced emf opposes the self induced emf. Obtain the conditional relationship as detailed in equation below for equivalent inductance:</p> $L \text{ (Equivalent inductance)} = (L_1 L_2 - M_2) / (L_1 + L_2 + 2M)$
C5	<p>In an AC circuit, using phasor diagrams and mathematical treatment prove that the current in a purely capacitive circuit leads the voltage by 90° and the average power consumed is zero. Also justify with an example of a circuit condition when the angle between voltage and current is not 90°.</p>
C6	<p>A balanced three star connected load is powered by three phase source. Mathematically derive an expression for the total power.</p>
C7	<p>Recall the condition of resonance in passive parallel electrical circuit (R-L-C) powered by a variable frequency source. Also represent the phenomena in a graph. Discuss your thoughts about power transfer phenomena in series and parallel circuit at resonance.</p>