

# Kerala Technological University

Sample Question Paper Set-1 :Basics of Electrical Engineering

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1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1	(a) Derive equivalent resistances for delta to star transformation.	05
	(b) Derive an expression for temperature coefficient at temperature $t$ , $\alpha_t = \alpha_0 / (1 + \alpha_0 t)$ . Where notations have usual meanings.	05
	(c) A 100 A current is shared by three resistances connected in parallel. The resistor wires are of the same material and have their length in the ratio 2:3:4 and their cross sectional area in the ratio 1:2:3. Determine the current in each resistor.	04
Q.2	(a) Define & explain following terms: (1) Magneto Motive Force (M.M.F.) (2) Reluctance (3) Magnetic Field Intensity.	03
	(b) Derive equation for energy stored in a capacitor	05
	(c) A 8 $\mu\text{F}$ capacitor is connected with 0.5 $\text{M}\Omega$ resistor across a 200 V d.c supply. Calculate:(i)the time constant,(ii)the initial charging current,(iii)time taken for the p.d across the capacitor to grow to 160 V and(iv)the current and voltage across the capacitor in 4 second after it is connected to the supply.	06
Q.3	(a) Obtain the relation $L = (L_1 L_2 - M^2) / (L_1 + L_2 + 2M)$ for equivalent inductance when two inductors are connected in parallel such that the mutually induced emf opposes the self induced emf.	07
	(b) Compare similarities and dissimilarities between electrical and magnetic circuit. A 10 $\mu\text{F}$ capacitor in series with an 1 $\text{M}\Omega$ resistor is connected across a 100 V supply. Determine	07
Q.4	(a) Prove that current in pure inductive circuit lags its voltage by $90^\circ$ .	07
	(b) Define the following terms with respect to AC waveforms (1) phase (2) Time period	04
	(c) 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 average value.	03
Q.5	(a) Explain series resonance circuit. Draw resonance curve.	07
	(b) Established relationship between line and phase voltages and currents in balanced delta connection. Draw complete phasor diagram of voltages and currents.	07
Q.6	(a) Explain two wattmeter method for 3-phase power measurement.	07
	(b) What is Battery? Explain the construction and working of any battery.	03
	(c) Draw & explain staircase wiring with necessary sketch.	04
Q.7	(a) Explain construction of cable.	05
	(b) What is an electric shock? Why grounding is required?	05
	(c) State types of fuse and explain any one.	04

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Sample Question Paper Set-2 :Basics of Electrical Engineering

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1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain KCL and KVL. Explain that why are domestic appliances connected in parallel? **07**
- (b) Derive the equation of Star to Delta and Delta to Star transformation. **07**
- Q.2** (a) Derive an expression for the voltage across the capacitor during charging through the resistor at any instant  $V_c = V (1 - e^{-t/\lambda})$  where  $V$  is the battery source voltage and  $\lambda$  is the time constant of the circuit. **07**
- (b) A  $10 \mu\text{F}$  capacitor in series with an  $1 \text{ M}\Omega$  resistor is connected across a  $100 \text{ V}$  supply. Determine **07**
- (a) The time constant of the circuit.
- (b) The initial value of charging current.
- (c) Initial rate of rise of voltage across the capacitor.
- (d) The capacitor voltage after a time equal to the time constant.
- (e) The circuit current at this time.
- (f) Voltage across the capacitor 3 sec after switch on.
- (g) The time taken for the capacitor voltage to reach  $50\text{V}$ .
- Q.3** (a) State similarities and dissimilarities between electric circuit and magnetic circuit. **07**
- (b) A circular iron ring has a cross sectional area of  $15 \text{ cm}^2$  and a mean length of  $18.84 \text{ cm}$  in iron, has an air gap of  $1.884 \text{ mm}$  made by a saw cut. **07**
- The relative permeability of iron is 1300 and the permeability of free space is  $4\pi \times 10^{-7} \text{ H/m}$ . The ring is wound with a coil of 1200 turns and carries  $8\text{mA}$  current. Find the air gap flux neglecting leakage and fringing.
- Q.4** (a) Define following terms with respect to a.c.waveform **07**
- (i) R.M.S. value (ii) Power factor (iii) Amplitude (iv) Form Factor
- (v) Phase (vi) Frequency (vii) Average value
- (b) Explain with the aid of a phasor diagram the phenomenon of resonance in a circuit containing an inductor, a capacitor and a resistor in series. **07**
- Q.5** (a) Explain the method of measuring 3- $\Phi$  power by two wattmeters. **07**
- (b) Prove that average power consumption in pure inductor is zero when a.c. voltage is applied. **07**
- Q.6** (a) Draw & explain staircase wiring with necessary sketch. **07**
- (b) What is the construction of three core cable? Explain each parts and its importance. **07**
- Q.7** (a) Explain the working of earth leakage circuit breaker(ELCB) with diagram. **07**
- (b) Explain the types of lighting schemes with suitable diagrams. **07**

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