

**KADI SARVA VISHWAVIDHYALAYA**

**BE SEMESTER I / II**

**Subject code:-**

**Subject Name:- Basic Electrical Engineering**

**Date: - 31/5/2013**

**Time: - 3 hrs**

**Total Marks:- 70**

**Instructions:**

1. Answer each question in separate Answer sheet.
2. Use of Scientific calculator is permitted.
3. All questions are **compulsory**.
4. Indicate **clearly**, the options you attempt along with its respective question number.
5. Use the last page of main supplementary of **rough work**.

**Section – I**

- Q -1**    (A) State Ohm's Law. Explain the effect of temperature on resistance on different types of material. [5]
- (B) State Joule's law of Electric heating. Define thermal efficiency with example. [5]
- (C ) A platinum coil has a resistance of  $3.146 \Omega$  at  $40^\circ C$  and  $3.676 \Omega$  at  $100^\circ C$ . [5]  
Find the resistance at  $0^\circ C$  and temperature coefficient of resistance at  $40^\circ C$ .

**OR**

- (C ) Find the current through  $4 \Omega$  resistance for the circuit shown in fig. 1 [5]
- Q-2**    (A) Explain charging of a capacitor. [5]
- (B) A series combination having  $R = 2 M \Omega$  and  $C = 0.01 \mu F$  is connected across d.c. voltage source of 50 V. Determine capacitor voltage and charging current after 0.02 s, 0.04 s . [5]

**OR**

- (A) Derive the expression for equivalent capacitance of a group of capacitors when they are connected ( i ) in parallel and ( ii ) in series. [5]
- (B) In the circuit of fig. 2 , Find ( i ) equivalent capacitance , ( ii ) voltage drop across each capacitor . All capacitance values are in  $\mu F$ . [5]

- Q-3**      (A) State and explain Faraday's Law of Electromagnetic Induction. [5]  
(B) Explain Magnetic Hysteresis. [5]

OR

- (A) Explain statically induced e.m.f. [5]  
(B) A coil has a time constant of 1 second and an inductance of 8 H. If the coil is connected to a 100 v d.c. source, determine ( i ) the rate of rise of current at the instant of switching ( ii ) time taken by the circuit to reach 60 % of the steady value of current. [5]

### Section - II

- Q-4**      (A) Define the following terms : (1) RMS value, (2) Average value ,  
                  (3) Frequency , (4) Form Factor , (5) Crest Factor. [5]  
(B) An alternating current varying sinusoidally with a frequency of 50 Hz has an RMS value of 20 A. Write down the equation for the instantaneous value of current and find the value 0.0025 second after passing through a positive maximum value of current. [5]  
(C) Explain CRO with block diagram. [5]

OR

- (C ) Explain measurement of A.C. voltage using CRO. [5]  
**Q-5**      (A) Prove that the current flowing through purely inductive circuit lags the applied voltage by 90°. [5]  
(B) A resistor of  $20 \Omega$  , inductor of  $0.2 \text{ H}$  and capacitor of  $100 \mu\text{F}$  are connected in series across  $220 \text{ V}$ ,  $50 \text{ Hz}$  single phase A.C. supply. Calculate (i) Reactance, (ii) Impedance, (iii) power factor , (iv) current , (v) power  
OR  
(A) Explain resonance in series RLC circuit. [5]  
(B) Two impedance  $Z_1 = ( 8 + j 6 )$  and  $Z_2 = ( 3 - j 4 )$  are in parallel. If the total current of combination is 25 A, Find the current taken by each impedance. [5]

Q-6 (A) Explain generation of polyphase voltage. [5]

(B) Derive the relationship between phase value and line value of voltage and current for three phase delta connection. [5]

OR

(A) Explain two wattmeter method to measure power in 3 phase circuit. [5]

(B) A balanced star connected load of  $(8 + j6)$  per phase is connected to balanced 3 phase 400 volt supply. Find the line current, power factor and power. [5]

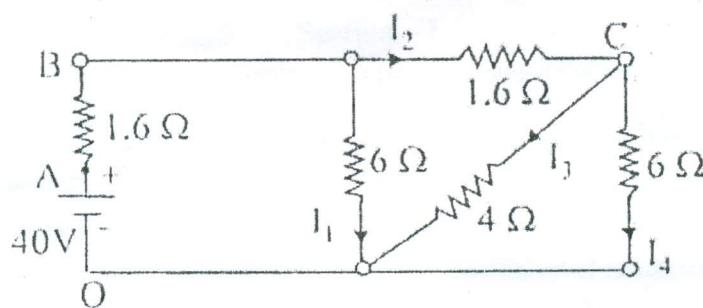


Fig. 1

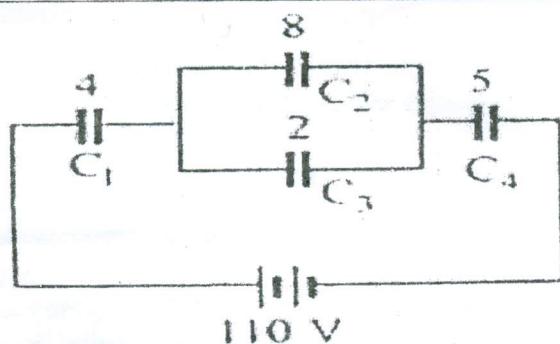


Fig. 2

----- All the Best -----

# Kadi Sarva Vishwavidyalaya

BE Sem-1

Subject: BASIC ELECTRICAL ENGINEERING

Date: 02/01/2013

Max. Marks: 70

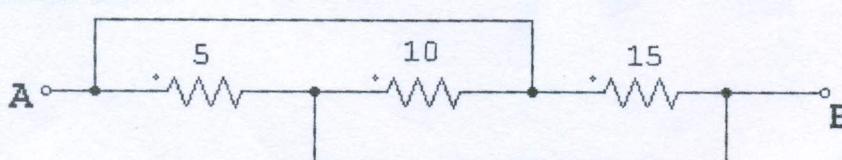
Time: 3 Hrs

Instruction: (1) Attempt all questions.

- (2) Figures to the right indicate full marks.
- (3) Answer each section in separate answer sheet.
- (4) Use the scientific calculator is permitted.

## Section - I

Q.1	[A]	1) The unit of specific resistance is..... 2) Two wire A & B of the same material and length l & 2l having a radius r & 2r respectively. The ratio of specific resistance will be..... 3) The rating of bulb is 100W, 220V. if it is operated at 110V, the power consumed by it will be..... 4) The dynamic induced emf is proportional to..... 5) 0.1 uF capacitor is connected across 2V battery, after a long time current in circuit will be .....	[5]
	[B]	Derive the equation for equivalent Resistance for Delta to Star conversion	[5]
	[C]	Derive the expression for energy stored in magnetic coil.	[5]
	<b>OR</b>		
	[C]	What is capacitance? Derive the expression of capacitance of parallel plate capacitor with composite dielectric material.	[5]
Q.2	[A]	Derive the expression for voltage across capacitor at any instant during the discharge of C across a resistor R.	[5]
	[B]	A 10 uF capacitor in series with 1MΩ resistor, is connected across 100V supply, Find 1) Time constant of circuit 2) Maximum value of charging current 3) Initial rate of rise of voltage across capacitor 4) Voltage across Capacitor at 3 sec. 5) Time taken for capacitor voltage to reach at 50V.	[5]
	<b>OR</b>		
Q.2	[A]	State and explain Faraday's laws of electromagnetic induction.	[5]
	[B]	Obtain the relation $L = \frac{L_1 L_2 - M^2}{L_1 + L_2 + 2M}$ for equivalent inductance when two inductors are connected in parallel such that the mutually-induced emf opposes the self-induced emf.	[5]
Q.3	[A]	State & explain Kirchoff's Laws.	[5]
	[B]	Derive an expression for temperature coefficient at temperature t, $\alpha_t = \frac{\alpha_0}{1 + \alpha_0 t}$ where. Notation have usual meaning.	[5]
	<b>OR</b>		
Q.3	[A]	Define terms: 1) Potential Difference 2) Electric field Intensity 3) Current Density 4) Power 5) Current.	[5]
	[B]	Find equivalent resistance of between terminal A & B from figure 1. All the value of resistance in ohm.	[5]



**Section - II**

Q.4	[A]	Explain the generation phenomena of alternating voltage and derive the expression for it.	[5]
	[B]	Define the terms: 1) RMS value 2) Frequency 3) Phase Difference 4) Power factor 5) Apparent Power.	[5]
	[C]	1) Prove that form factor of sinusoidal waveform is 1.11 2) Prove that Peak factor of sinusoidal waveform is 1.41 3) Draw the phasor diagram of 1) $I_1 = 4 \sin(\omega t - 45^\circ)$ 2) $I_2 = 2 \sin(\omega t - 30^\circ)$ .	[5]
	OR		
Q.5	[C]	Prove that for 3-phase balanced load system summation of $I_R$ , $I_V$ , $I_B$ is zero.	[5]
	[A]	Prove that average power consumed by pure inductive circuit is zero.	[5]
	[B]	A resistor of $100\Omega$ is connected in series with a $56\mu F$ capacitor to a supply at $230V$ , $50$ Hz. Determine 1) Impedance 2) Phase difference 3) Power factor 4) voltage across R & C. 5) Phasor diagram.	[5]
	OR		
Q.5	[A]	Explain the admittance method for solving parallel a.c. circuits.	[5]
	[B]	A balanced 3-phase star connected load of $70\text{ kW}$ takes a leading current of $69\text{ A}$ . The supply voltage is $600V$ , $50$ Hz. Find the power factor of the load, Resistance, Capacitance and impedance of the load.	[5]
Q.6	[A]	Explain Two-wattmeter method for measuring 3-phase power.	[5]
	[B]	Derive the relation between line voltage and phase voltage for 3-phase star connected balanced load system with phasor diagram.	[5]
	OR		
Q.6	[A]	Define Q-factor for the series R-L-C circuit at resonance and derive the expression of it.	[5]
	[B]	Discuss the variation of following quantities with frequency for a series circuit above and below the resonance condition: circuit impedance, current, $X_L$ & $X_C$ .	[5]

\*\*\*\*\*Best of luck\*\*\*\*\*

## B.E. Semester: - I (EC/CE/CIVIL)

Subject Code: - CC102

Subject Name: - Basic Electrical Engineering

Date: - 23 /12/2013

Time: - 10:00 am to 1:00 pm

Total Marks: - 70

**Instructions:**

1. Answer each section in separate Answer Sheet.
2. Use of scientific calculator is permitted.
3. All questions are **Compulsory**.
4. Indicate **clearly**, the options you attempt along with its with respective question number.
5. Use the last page of main supplementary of **rough work**.

**Section – I****Q.1 All Compulsory**

- (A) What do you mean by Electrical Current? Give It Unit. Explain why the flow of electron is in electric circuit is opposite of conventional Current? 5
- (B) Define (1) Conductance (2) Form factor (3) Crest Factor (4) Torque (5) Energy 5
- (C) Giving reason in brief, state the effect of increase in temperature on the resistance. 5

**OR**

- (C) Why are domestic appliances connected in parallel? Explain KVL and KCL. 5

**Q.2 Answer the following question.**

- (A) What are the factor affecting the resistance of a conductor? How they affect its value? 5
- (B) Derive an expression for temperature coefficient at temperature  $t$ ,  $\alpha_t = \alpha_0 / (1 + \alpha_0 t)$ , Where notations have usual meanings. 5

**OR**

- (A) Different between an open circuit and short circuit. Draw their characteristics on v-i plane. 5
- (B) Draw electric field lines and equipotential lines for the following: 5
- (i) A negative points charge
  - (ii) A pair of Equal and opposite charge separated by a Distance.
  - (iii) Two equal negative charge separated by a Distance.

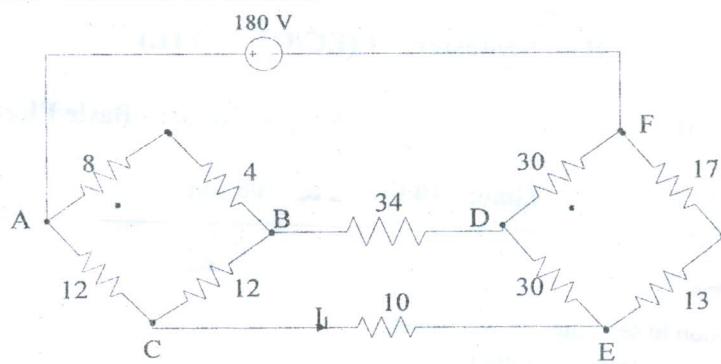
**Q.3 Answer the following question.**

- (A) A D.C. voltage  $V$  is applied across a circuit consisting of resistance  $R$  ohm in series with a capacitor of capacitance  $C$  farads. Derive an expression for variation of voltage across  $C$  with time. 5
- (B) Derive expression for delta to star conversion of resistive network 5

**OR**

- (A) Derive an Expression for the potential Energy stored in an electric Field. 5

- (B) Calculate the current flowing through the  $10\Omega$  resistor of Fig. By using star-delta transformation. All resistances are in ohms. 5



## Section - II

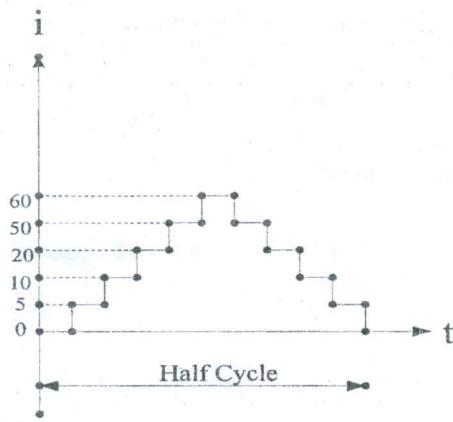
### Q.4 All Compulsory

- (A) Two Coils are connected in series, Derive expressions for the total inductance when (i) the coils are in series aiding connection (ii) the coils are in series opposing connection 5
- (B) Explain what do you mean by the average value, peak value, r.m.s value of an alternating voltage wave. Find the relation between these values of sinusoidal voltage waveform. 5
- (C) Give the similarities and dissimilarities between Electrical circuit and magnetic circuit. 5
- OR**
- (C) Prove that average power consumption in pure inductor is zero when A.C. voltage is applied. 5

### Q.5 Answer the following question.

- (A) Derive the expressions for rise of current in R-L series circuit excited by D.C. voltage. 5  
Discuss the role of time constant in this case.
- (B) State the Lenz's law and explain statically induced emf and Dynamically induced emf 5
- OR**
- (A) What is impedance triangle? Draw impedance triangle and phasor diagram for (i) series R-L circuit (ii) Series R-C circuit (iii) series R-L-C circuit. 5
- (B) Find the average value, r.m.s value, the form factor and peak factor of a periodic wave having the following values for equal time interval changing suddenly from one value to the next. 5  
0,5,10,20,50,60,50,20,10,0,-5,-10 V, etc.  
What would be the r.m.s value of a sine wave having the same peak value?

2/3



**Q.6 Answer the following question.**

(A) Explain the Block Diagram of C.R.O. 5

(B) What is the relationship between (a) phase voltage and line current (b) phase current and line current for star system? Derive these relations and also draw phasor diagram. 5

**OR**

(A) In series R-L-C circuit, resonance condition can be achieved in three ways. Name these three ways and explain it 5

(B) A balanced three phase supply is given to a star connected load. Give proof of two wattmeter method for this system. State demerits of this method and draw the phasor diagram. 5

\*\*\*\*\**All the Best*\*\*\*\*\*

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# KADI SARVA VISHWAVIDHYALAYA

## B.E. Semester: - I (EC/CE/CIVIL)

Subject Code: - CC102

Subject Name: - Basic Electrical Engineering

Date: - 27 /12/2014

Time: - 10:30 am to 1:30 pm

Total Marks: - 70

### Instructions:

1. Answer each section in separate Answer Sheet.
2. Use of scientific calculator is permitted.
3. All questions are **Compulsory**.
4. Indicate **clearly**, the options you attempt along with its with respective question number.
5. Use the last page of main supplementary of **rough work**.

### Section - I

#### Q.1 All Compulsory

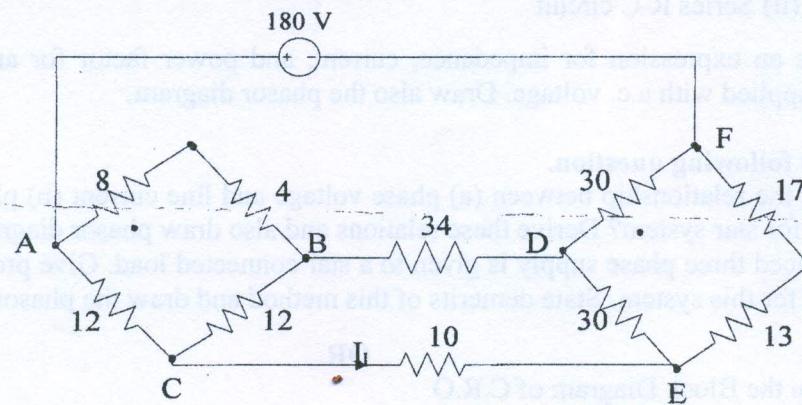
- (A) Derive expression for delta to star conversion of resistive network. 5  
(B) Derive an expression for temperature coefficient at temperature  $t$ ,  $\alpha_t = \alpha_0 / (1 + \alpha_0 t)$ , Where 5  
notations have usual meanings.  
(C) Giving reason in brief, state the effect of increase in temperature on the resistance. 5

OR

- (C) Why are domestic appliances connected in parallel? Explain KVL and KCL. 5

#### Q.2 Answer the following question.

- (A) Define (1) Electric Flux (2) Form factor (3) Crest Factor (4) Torque (5) Energy 5  
(B) Calculate the current flowing through the  $10\Omega$  resistor of Fig. By using star-delta 5  
transformation. All resistances are in ohms.



OR

- (A) Prove for capacitance of a parallel plate capacitor  $C = \epsilon_0 \epsilon_r A / d$ . 5  
(B) Explain Charging of Capacitor. 5

**Q.3 Answer the following question.**

- (A) Derive the Expression for Equivalent Capacitance of A Group of Capacitors When  
(1) They Are Connected In Parallel And  
(2) They Are Connected In Series  
(B) Explain Discharging of Capacitor

5

**OR**

- (A) A parallel plate capacitor has a plate area separated by three slabs of different dielectric materials of thickness 0.3, 0.4 and 0.3 mm. with relative permittivity of 3, 2.5 and 2 respectively. calculate the capacitance of each material and the voltage across them if the supply is 1000 V.  
(B) Prove  $Rt_2 = R t_1 [1 + \alpha_1 (t_2 - t_1)]$ , where notations have usual meanings.

5

5

**Section – II**

**Q.4 All Compulsory**

- (A) Prove that average power consumption in purely capacitive circuit is zero when A.C. voltage is applied.  
(B) Explain what do you mean by the average value, peak value, r.m.s value of an alternating voltage wave. Find the relation between these values of sinusoidal voltage waveform.  
(C) Give the similarities and dissimilarities between Electrical circuit and magnetic circuit.

5

5

5

**OR**

- (C) Two Coils are connected in series, Derive expressions for the total inductance when (i) the coils are in series aiding connection (ii) the coils are in series opposing connection

5

**Q.5 Answer the following question.**

- (A) Derive an expression for impedance, current, and power factor for an R-L-C series circuit when applied with a.c. voltage. Draw also the phasor diagram.  
(B) State the Lenz's law and explain statically induced emf and Dynamically induced emf

5

5

**OR**

- (A) What is impedance triangle? Draw impedance triangle and phasor diagram for (i) series R-L circuit (ii) Series R-C circuit  
(B) Derive an expression for impedance, current, and power factor for an R-L- series circuit when applied with a.c. voltage. Draw also the phasor diagram.

5

5

**Q.6 Answer the following question.**

- (A) What is the relationship between (a) phase voltage and line current (b) phase current and line current for star system? Derive these relations and also draw phasor diagram.  
(B) A balanced three phase supply is given to a star connected load. Give proof of two wattmeter method for this system. State demerits of this method and draw the phasor diagram

5

5

**OR**

- (A) Explain the Block Diagram of C.R.O  
(B) In series R-L-C circuit, resonance condition can be achieved in three ways. Name these three ways and explain it.

5

5

# KADI SARVA VISHWAVIDHYALAYA

B.E. Semester: I (EC/CE/CIVIL)

Subject Code: - CC102

Subject Name: - Basic Electrical Engineering

Date: - 29/12/2015

Time: - 10:30 am to 1:30 pm

Total Marks: - 70

## Instructions:

1. Answer each section in separate Answer Sheet.
2. Use of scientific calculator is permitted.
3. All questions are **Compulsory**.
4. Indicate **clearly**, the options you attempt along with its with respective question number.
5. Use the last page of main supplementary of **rough work**.

## Section – I

### Q.1 All Compulsory

- (A) Why are domestic appliances connected in parallel? Explain KVL and KCL. 5  
(B) Derive expression for delta to star conversion of resistive network. 5  
(C) Giving reason in brief, state the effect of increase in temperature on the resistance. 5

**OR**

- (C) Prove  $Rt_2 = R t_1 [1 + \alpha_1 (t_2 - t_1)]$ , where notations have usual meanings. 5

### Q.2 Answer the following question.

- (A) Define (1) Magnetic flux (2) Form factor (3) Crest Factor (4) Power factor (5) Energy 5  
(B) Determine the current in 17 ohm resistor in the network shown in figure (a). 5

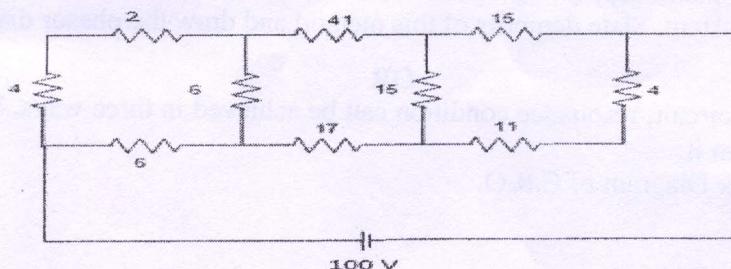


Figure (a)

**OR**

- (A) Derive the Expression for Equivalent Capacitance of A Group of Capacitors When 5  
    (1) They Are Connected In Parallel And (2) They Are Connected In Series.

- (B) Explain Discharging of Capacitor. 5

### Q.3 Answer the following question.

- (A) Prove for capacitance of a parallel plate capacitor  $C = \epsilon_0 \epsilon_r A / d$ . 5  
(B) Explain Charging of Capacitor. 5

**OR**

- (A) A parallel plate capacitor has a plate area separated by three slabs of different dielectric materials of thickness 0.3, 0.4 and 0.3 mm. with relative permittivity of 3, 2.5 and 2 respectively. calculate the capacitance of each material and the voltage across them if the supply is 1000 V. 5

- (B) Derive an expression for temperature coefficient at temperature t,  $\alpha_t = \alpha_0 / (1 + \alpha_0 t)$ , Where 5  
notations have usual meanings.

## Section – II

### Q.4 All Compulsory

(A) Explain what do you mean by the average value, peak value, r.m.s value of an alternating voltage wave. Find the relation between these values of sinusoidal voltage waveform. 5

(B) Give the similarities and dissimilarities between Electrical circuit and magnetic circuit. 5

(C) Two Coils are connected in series, Derive expressions for the total inductance when (i) the coils are in series aiding connection (ii) the coils are in series opposing connection 5

**OR**

(C) Prove that average power consumption in purely inductor is zero when A.C. voltage is applied. 5

### Q.5 Answer the following question.

(A) State the Lenz's law and explain statically induced emf and Dynamically induced emf. 5

(B) Derive an expression for impedance, current, and power factor for an R-L-C series circuit when applied with a.c. voltage. Draw also the phasor diagram. 5

**OR**

(A) Derive an expression for impedance, current, and power factor for an R-L- series circuit when applied with a.c. voltage. Draw also the phasor diagram. 5

(B) An alternating e.m.f. is represented by  $e = 230\sin 314t$  V. Determine: (i) frequency (ii) time period (iii) angular frequency. 5

### Q.6 Answer the following question.

(A) What is the relationship between (a) phase voltage and line voltage (b) phase current and line current for a three phase star system? Derive these relations and also draw phasor diagram. 5

(B) A balanced three phase supply is given to a star connected load. Give proof of two wattmeter method for this system. State demerits of this method and draw the phasor diagram 5

**OR**

(A) In series R-L-C circuit, resonance condition can be achieved in three ways. Name these three ways and explain it. 5

(B) Explain the Block Diagram of C.R.O. 5

\*\*\*\*\*All the Best\*\*\*\*\*