

Presidency University, Bengaluru
School of Engineering

II Semester 2015-2016

Comprehensive Examination

Course: **EEE A 102 Electrical Sciences**
(Closed Book)

Max Marks: 80

Max Time: 180 Min

Weightage: 40 %

24 May 2016

Set A

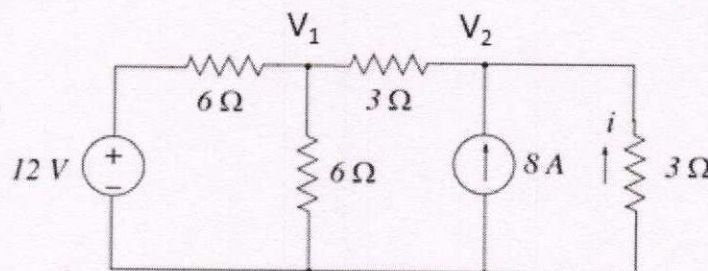
- i. Write all the parts of question paper in the same answer booklet.
- ii. All the questions of each part shall be written together.

PART A: (12 Questions x 3 Marks = 36 Marks)

1. Define the Ohm's, Kirchhoff's Current (KCL) and Kirchhoff's Voltage (KVL) laws. [3 M]
2. Write the formula for resistances for converting a star network into its equivalent delta network. [3 M]
3. Calculate the capacitance and energy stored in a parallel-plate capacitor which consists of two metal plates, each 50 cm^2 separated by a dielectric of 1.2 mm thickness and of $\epsilon_r = 2.5$ if a p.d. of 800 V is applied across it. [3 M]
4. Compare between p-type and n-type semiconductor materials. [3 M]
5. State and explain briefly the Thevenin's theorem. [3 M]
6. A capacitor of $8 \mu\text{F}$ takes a current of 1 amp, when the alternating voltage applied across it is 230 volts. Calculate the frequency of the applied voltage. [3 M]
7. Draw the forward and reverse static characteristics curve of a silicon P-N junction diode. [3 M]
8. Draw the neat Circuit diagram and phasor diagram for **parallel R-C circuit**. [3 M]
9. Draw the circuit diagram of a PNP transistor connected in Common Base (CB) configuration with proper supply voltages. [3 M]
10. Show that the Power consumed by a Pure Capacitive circuit is zero. [3 M]
11. A circuit consists of a resistance of 20Ω and a capacitance of $80 \mu\text{F}$ connected in series. A supply of 200 V at 50 Hz is applied across the circuit. Find the power factor and power consumed by the circuit. [3 M]
12. Draw the phasor diagram and impedance triangle for an **AC circuit with R & L**. [3 M]

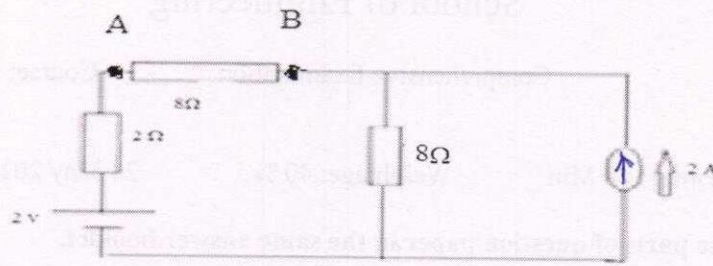
PART B: (4 Questions x 6 Marks = 24 Marks)

13. Explain the operation of a Half Wave Rectifier (HWR) by giving its proper circuit diagram, waveforms and formula for current and efficiency (no need to derive them). [6 M]
14. Find the value of the current i as shown in the figure below using nodal analysis. Comment on the direction of the current. [6 M]



[6 M]

15. By means of Thevenin's theorem, Calculate the current & Voltage drop across A-B in the network.



[6 M]

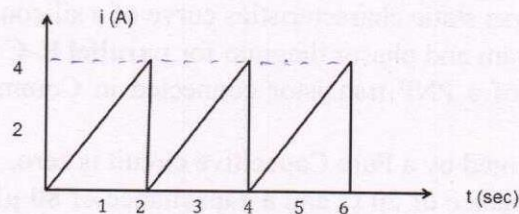
16. Determine, for the case in which $C = 0.01 \mu\text{F}$, $R = 100 \text{ K}\Omega$ and $V = 800 \text{ V}$, the voltage to which the capacitor has been charged when the charging current has decreased to 70 per cent of its initial value, and the time taken for the current to decrease to 70 per cent of its initial value.

[6 M]

PART C: (2 Questions x 10 Marks = 20 Marks)

17. Explain the functioning of a bridge type full-wave rectifier by giving its proper circuit diagram, waveforms and formula for current and efficiency (no need to derive them). Explain the importance of capacitor filter (smoothing circuit) in the context of a half-wave rectifier. [6 + 4 = 10 M]

18. Determine the average and r.m.s. value of the periodic sawtooth waveform shown below (Hint: this is not a triangular waveform):



[5 x 2 = 10 M]

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Set B

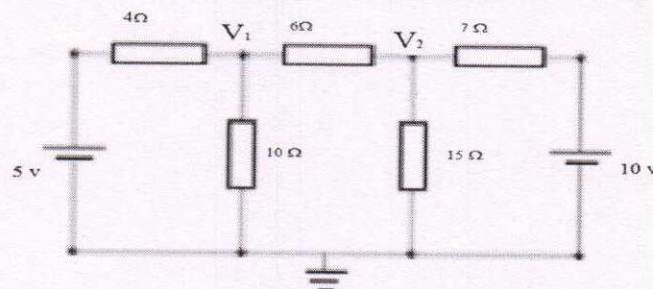
- i. Write all the parts of question paper in the same answer booklet.
- ii. All the questions of each part shall be written together.

PART A: (12 Questions x 3 Marks = 36 Marks)

| | Question | Answer |
|-----|---|--------|
| 1. | Define the Voltage Gain, Current Gain and Power Gain in the context of an electronic circuit. | [3 M] |
| 2. | Write the formula for resistances for converting a delta network into its equivalent star network. | [3 M] |
| 3. | If two capacitors having capacitances of $4 \mu\text{F}$ and $6 \mu\text{F}$ respectively are connected in series across a 250 V supply, find (a) the p.d. across each capacitor; (b) the charge on each capacitor. | [3 M] |
| 4. | What is Peak Inverse Voltage (PIV) of a diode? Give the PIV value of half-wave, full-wave and bridge rectifiers. | [3 M] |
| 5. | State and explain briefly the Norton's theorem. | [3 M] |
| 6. | A coil of 250 turns, wound on a core of non-magnetic material, has an inductance of 20 mH. Calculate: (a) the flux produced by a current of 10 A; (b) the average value of the e.m.f. induced when a current of 10 A is reversed in 10 ms (milliseconds). | [3 M] |
| 7. | Draw the neat Circuit diagram and phasor diagram for parallel R-L circuit . | [3 M] |
| 8. | Draw the forward and reverse static characteristics curve of a germanium P-N junction diode. | [3 M] |
| 9. | Draw the circuit diagram of an NPN transistor connected in Common Emitter (CE) configuration with proper supply voltages. | [3 M] |
| 10. | Show that the Power consumed by a Pure Resistive circuit is given by $P = VI$. | [3 M] |
| 11. | A circuit consists of a resistance of 12Ω , an inductance of 15 mH and a capacitance of $100 \mu\text{F}$ connected in series. A supply of 100 V at 50 Hz is given to the circuit. Find the power factor and power consumed by the circuit. | [3 M] |
| 12. | Draw the phasor diagram and impedance triangle for an AC circuit with R & C . | [3 M] |

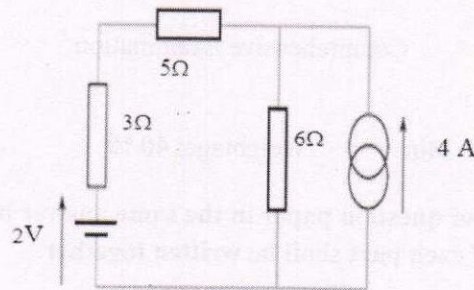
PART B: (4 Questions x 6 Marks = 24 Marks)

13. Explain the operation of a P-N junction diode with the help of a circuit diagram and its characteristics. [6 M]
14. Using node voltage method calculate the voltage V_1 & V_2 and current in 10Ω resistance.



[6 M]

15. Find the voltage across the $6\ \Omega$ resistor in Fig. below using super position theorem.



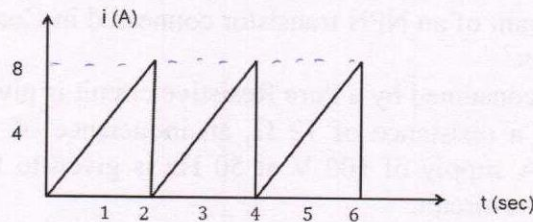
[6 M]

16. A $60\ \mu\text{F}$ capacitor is connected in series with a $6000\ \Omega$ resistor. Determine the time constant of the circuit. If the combination is connected suddenly to a $120\ \text{V}$ d.c. supply, find: (a) the initial rate of rise of p.d. across the capacitor; (b) the initial charging current; (c) the ultimate charge in the capacitor; and (d) the ultimate energy stored in the capacitor.

[6 M]

PART C: (2 Questions x 10 Marks = 20 Marks)

17. Explain the two-diode full-wave rectifier by giving its proper circuit diagram, waveforms and formula for current and efficiency (no need to derive them). Explain the importance of capacitor filter (smoothing circuit) in the context of a half-wave rectifier. [6 + 4 = 10 M]
18. Determine the average and r.m.s. value of the periodic sawtooth waveform shown below (Hint: this is not a triangular waveform):



[5 x 2 = 10 M]

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II Semester 2015-2016

Test 1

Course: **EEE A 102 Electrical Sciences**
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Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

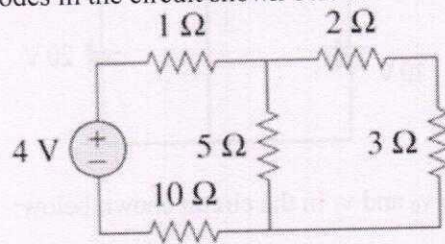
21 Mar 2016

Set A

Q 1 Answer the following in short

(5Q x 2M= 10M)

A. Indicate the number of branches and nodes in the circuit shown below:



B. Define (a) 1 Ampere (b) 1 Volt

C. If two capacitors having capacitances of $2 \mu\text{F}$ and $8 \mu\text{F}$ respectively are connected in series across a 200 V supply, find (a) the p.d. across each capacitor; (b) the charge on each capacitor.

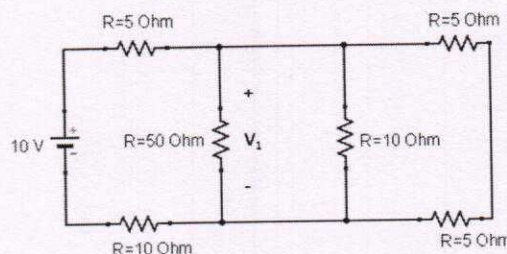
D. A coil of 200 turns, wound on a core of non-magnetic material, has an inductance of 15 mH. Calculate: (a) the flux produced by a current of 8 A; (b) the average value of the e.m.f. induced when a current of 8 A is reversed in 10 ms (milliseconds).

E. State and explain briefly the Superposition theorem

2 Answer the following

(2Q x 4M= 8M)

1. Find the voltage V_1 across the 50 ohm resistor using division of voltage method in the figure shown below:



2. Determine, for the case in which $C = 0.02 \mu\text{F}$, $R = 200 \text{ K}\Omega$ and $V = 1000 \text{ V}$, the voltage to which the capacitor has been charged when the charging current has decreased to 80 per cent of its initial value, and the time taken for the current to decrease to 80 per cent of its initial value.

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Test 1

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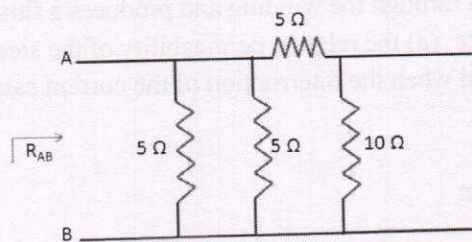
21 Mar 2016

Set B

Q 1 Answer the following in short

(5Q x 2M= 10M)

A. Find the value of the equivalent resistance R_{AB} of the circuit shown in the figure below:



B. Identify the value of a resistor along with its tolerance range, which has the following color bands:

- First Band: Green
- Second Band: Blue
- Third Band: Orange
- Fourth Band: Gold

C. Define the Kirchhoff's Current (KCL) and Kirchhoff's Voltage (KVL) laws.

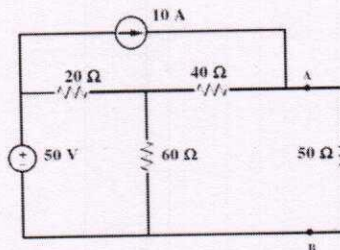
D. A coil consists of two similar sections wound on a common core. Each section has an inductance of 0.08 H. Calculate the inductance of the coil when the sections are connected (a) in series, (b) in parallel.

E. State and explain briefly the Thevenin's theorem

Q 2 Answer the following

(2Q x 4M= 8M)

1. Find the Norton equivalent circuit to the left of terminals A-B for the network shown below. Connect the Norton equivalent circuit to the load and find the current in the 50 Ω resistor



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Test 1

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Max Marks: 30

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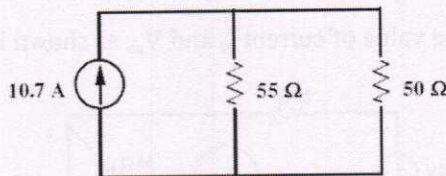
21 Mar 2016

Set C

Q 1 Answer the following in short

(5Q x 2M= 10M)

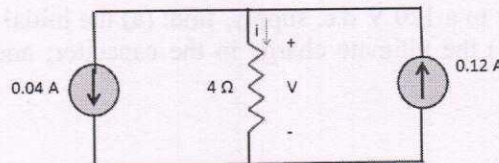
A. Convert the following circuit to a single voltage source network



B. Three capacitors have capacitances of 12 μF , 15 μF and 18 μF respectively. Calculate the total capacitance when they are connected (a) in parallel, (b) in series.

C. Convert the following circuit to a single current source network

D. Find the value of voltage 'v' across the 4 Ω resistor as shown in the circuit below:

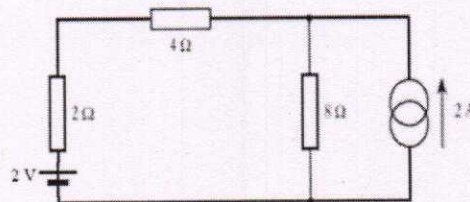


Calculate the capacitance and energy stored in a parallel-plate capacitor which consists of two metal plates, each 60 cm^2 separated by a dielectric of 1.5 mm thickness and of $\epsilon_r = 3.5$ if a p.d. of 1000 V is applied across it.

Q 2 Answer the following

(2Q x 4M= 8M)

1. By means of the Superposition theorem, calculate the currents in the network



| | | |
|-------------|---------------|--------------------------------|
| ID No _____ | Section _____ | Signature of Invigilator _____ |
|-------------|---------------|--------------------------------|

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II Semester 2015-2016

Quiz 1

Course: **EEE A 102 Electrical Sciences**
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Max Marks: 10

Max Time: 30 Min

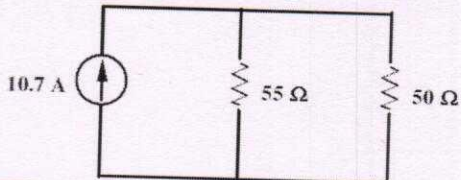
Weightage: 5 %

Date 16 April 2016

Set A

Instructions to Candidates

1. Write legibly with pen only and do not over write. Write ID No, Section No in the designated place
2. Answer the questions in the question paper itself, no extra answer book shall be provided. Rough work can be done at the back of the sheet

| Q. No. | Question (One Mark Each) | Answer |
|--------|---|--------|
| 1. | Electricity carries: (a) information only (b) energy only (c) signals (d) information and energy both. | |
| 2. | When two resistances having values as $R_1 = 15 \Omega$ and $R_2 = 25 \Omega$ are connected in parallel with an 80 A current source, the value of current I_2 flowing through R_2 is given as: (a) 30 A (b) 29 A (c) 28 A (d) 27 A. | |
| 3. | According to Lenz's law, the current induced in a coil always _____ the cause producing it. | |
| 4. | Increased capacitance can be obtained by connecting the given capacitors in _____. | |
| 5. | The "Superposition theorem" is essentially based on the concept of..... | |
| 6. | The self-inductance L is given by (a) $N\Phi I$ (b) NI / Φ (c) $N\Phi / I$ (d) $I / N\Phi$ | |
| 7. | In nodal analysis technique Kirchhoff's Voltage Law (KVL) is used. (True / False). | |
| 8. | Norton's equivalent circuit consists of (a) Series combination of R_{Th} , E_{Th} and R_L (b) Series combination of R_{Th} , E_{Th} (c) Parallel combination of I_{SC} , R_N (d) Parallel combination of R_N , I_{SC} and R_L . | |
| 9. | For an a.c. generator with 2 pairs of poles and with a frequency of 120 Hz, the speed in revolutions per minute will be..... | |
| 10. | The Thevenin's equivalent circuit for the given network is given by..... <div style="text-align: center;">  </div> | |

| | | |
|-------------|---------------|--------------------------------|
| ID No _____ | Section _____ | Signature of Invigilator _____ |
|-------------|---------------|--------------------------------|

Presidency University, Bengaluru
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II Semester 2015-2016

Quiz 1

Course: **EEE A 102 Electrical Sciences**
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Max Marks: 10

Max Time: 30 Min

Weightage: 5 %

Date 16 April 2016

Set B

Instructions to Candidates

1. Write legibly with pen only and do not over write. Write ID No, Section No in the designated place
2. Answer the questions in the question paper itself, no extra answer book shall be provided. Rough work can be done at the back of the sheet

| Q. No. | Question (One Mark Each) | Answer |
|--------|---|--------|
| 1. | Aacross a resistor bypasses that resistor. | |
| 2. | The current through a parallel circuit with two resistances having values as $R_1 = 15 \Omega$ and $R_2 = 25 \Omega$ when connected with a 75 V supply is given as: (a) 9 A (b) 7 A (c) 8 A (d) 10 A. | |
| 3. | Capacitance of a parallel-plate capacitor increases with increase in its plate separation. (True / False) | |
| 4. | When a $2 \mu\text{F}$ capacitor is series-connected with a parallel combination of $6 \mu\text{F}$ and $3 \mu\text{F}$ capacitors, the total capacitance is _____ μF . (a) 2 (b) 11 (c) 4 (d) 1 | |
| 5. | Whenever flux linked with a circuit changes, an _____ is always induced in it. | |
| 6. | In a series d.c. circuit, the voltage remains same in all the circuit elements. (True / False). | |
| 7. | Find R_{Th} for the circuit shown in figure: <div style="text-align: center;"> </div> | |
| 8. | Mutually induction between two coils is dependent on the number of turns of both coils. (True / False) | |
| 9. | The _____ value of AC quantity is defined as the value of that quantity at a particular instant of time. (a) D.C. (b) A.C. (c) Instantaneous (d) R.M.S. | |
| 10. | Thevenin's equivalent circuit consists of (a) Series combination of R_{Th} , E_{Th} and R_L (b) Series combination of R_{Th} , E_{Th} (c) Parallel combination of R_{Th} , E_{Th} (d) Parallel combination of R_{Th} , E_{Th} and R_L . | |

| | | | |
|-------|-------|---------------|--------------------------|
| ID No | _____ | Section _____ | Signature of Invigilator |
|-------|-------|---------------|--------------------------|

Presidency University, Bengaluru
School of Engineering

II Semester 2015-2016

Quiz 1

Course: **EEE A 102 Electrical Sciences**
(Closed Book)

Max Marks: 10

Max Time: 30 Min

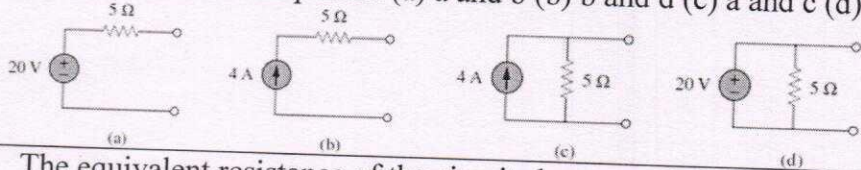
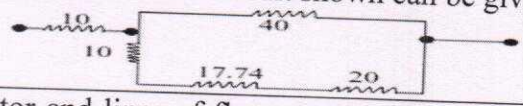
Weightage: 5 %

Date ²¹ ~~16~~ April 2016

Set C

Instructions to Candidates

1. Write legibly with pen only and do not over write. Write ID No, Section No in the designated place
2. Answer the questions in the question paper itself, no extra answer book shall be provided. Rough work can be done at the back of the sheet

| Q. No. | Question (One Mark Each) | Answer |
|--------|---|--------|
| 1. | In a parallel d.c. circuit, the current remains same in all the branches. (True / False). | |
| 2. | When two resistances having values as $R_1 = 15 \Omega$ and $R_2 = 25 \Omega$ are connected in series with an 80 A current source, the value of voltage V_2 flowing through R_2 is given as: (a) 40 V (b) 50 V (c) 60 V (d) 70 V. | |
| 3. | The equivalent circuit pair is: (a) a and b (b) b and d (c) a and c (d) c and d.  | |
| 4. | The equivalent resistance of the circuit shown can be given by  | |
| 5. | When the conductor and lines of flux are parallel then the force experience by the conductor is ____ (a) Zero (b) Maximum (c) Small (d) Unity | |
| 6. | 1 volt is the potential difference (voltage) between two points when is used to move 1 coulomb of charge from one point to the other. | |
| 7. | A coil of 2000 turns produces a flux of 1mWb. The flux is reversed in 0.1 sec then emf induced is ____ Volts. (a) 10 (b) 20 (c) 40 (d) 60 | |
| 8. | Induced emf can be either mutually induced or statically induced. (True / False) | |
| 9. | An ac voltage is represented by $30 \sin \omega t$. The peak-to-peak value of voltage is given by..... | |
| 10. | _____ Capacitors have the highest values of capacitance. (a) Electrolytic (b) Ceramic (c) Plastic-film (d) Mica | |

Presidency University, Bengaluru
School of Engineering

II Semester 2015-2016

Test 2

Course: **EEE A 102 Electrical Sciences**
(Open Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

02 May 2016

Set A

The following questions carry 2 marks each (2 x 5 = 10 Marks)

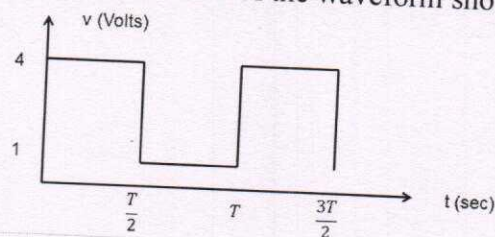
1. A current waveform is given by $20 \sin(300t + 4.57)$ A. Find:
(a) the peak value of current
(b) the r.m.s. value of current
(c) the average value of current is
(d) angular frequency of the supply
2. An a.c. generator with 4 poles has been rotating at a speed of 2000 rotations per minute. Calculate the number of cycles per revolution for the generator to generate an e.m.f. in 4 revolutions per second.
3. What is meant by lagging and leading Power Factor?
4. Define Apparent Power.
5. Draw the waveform and phasor diagram for pure inductive circuit.

The following questions carry 4 marks each (4 x 2 = 8 Marks)

6. A sinusoidal voltage source is expressed as $v(t) = 24 \sin(50t + 30^\circ)$ V. Find (a) the amplitude, (b) phase angle, (c) time period, (d) frequency and (e) the instantaneous value of voltage at time $t = 20$ msec.
7. A circuit consists of a resistance of 20Ω , an inductance of 0.05 H connected in series. A supply of 230 V at 50 Hz is applied across the circuit. Find the current, power factor and power consumed by the circuit. Draw the phasor diagram (not to scale).

The following questions carry 6 marks each (6 x 2 = 12 Marks)

8. Find the (a) average value and (b) r.m.s. value of the waveform shown in figure below:



9. A 230 V, 50 Hz ac supply is applied to a coil of 0.06 H inductance and 2.5Ω resistance connected in series with a $6.8 \mu\text{F}$ capacitor. Calculate (i) Impedance (ii) Current (iii) Phase angle between current and voltage (iv) power factor (v) power consumed.

Presidency University, Bengaluru
School of Engineering

II Semester 2015-2016

Test 2

Course: **EEE A 102 Electrical Sciences**
(Open Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

02 May 2016

Set B

The following questions carry 2 marks each (2 x 5 = 10 Marks)

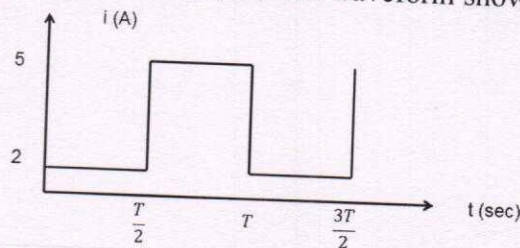
1. What happens to the peak voltage of an a.c. waveform if the r.m.s. voltage in the circuit is doubled?
2. A coil in an a.c. generator rotates at 50 Hz. How much time elapses between successive peak e.m.f. values of the coil?
3. Define Active Power.
4. Define Reactive Power.
5. Draw the waveform and phasor diagram for pure capacitive circuit.

The following questions carry 4 marks each (4 x 2 = 8 Marks)

6. A sinusoidal current source is expressed as $i(t) = 48 \sin(60t + 60^\circ)$ V. Find (a) the amplitude, (b) phase angle, (c) time period, (d) frequency and (e) the instantaneous value of current at time $t = 40$ msec.
7. A circuit consists of a resistance of 25Ω and a capacitance of $100 \mu\text{F}$ connected in series. A supply of 200 V at 50 Hz is applied across the circuit. Find the current, power factor and power consumed by the circuit. Draw the phasor diagram (not to scale).

The following questions carry 6 marks each (6 x 2 = 12 Marks)

8. Find the (a) average value and (b) r.m.s. value of the waveform shown in figure below:



9. A coil of Inductance 0.1 H and negligible resistance is connected in series with a 25Ω resistor. The circuit is energized from a 230 V, 50 Hz source. Calculate:
(a) the current in the circuit; (b) the p.d. across the coil; (c) the p.d. across the resistor; (d) the phase angle of the circuit. Draw (not to scale) a phasor diagram representing the current and the component voltages.

Presidency University, Bengaluru
School of Engineering

II Semester 2015-2016

Test 2 (MM)

Course: **EEE A 102 Electrical Sciences**
(Open Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

65
02 May 2016

Set C

The following questions carry 2 marks each (2 x 5 = 10 Marks)

Question

Answer

1. An a.c. generator with 6 poles undergoes through 25 cycles per revolution and completes 4 revolutions in a second to generate an e.m.f. What will be the speed of the generator in revolutions per minute?
2. The form factor of an a.c. current is 1.5 when it passes through a resistor. If the peak factor is 2, find the ratio of the r.m.s. value of the current to the maximum value of the current.
3. Sketch Power Triangle.
4. Draw the phasor diagram and impedance triangle for the AC circuit with R & L.
5. Draw the phasor diagram & impedance triangle for the AC circuit with R & C.

The following questions carry 4 marks each (4 x 2 = 8 Marks)

6. A coil of 200 turns is rotated at 2400 rotations / min in a magnetic field having a uniform density of 0.07 T, the axis of rotation being at right angles to the direction of the flux. The mean area per turn is 20 cm². Calculate
 - (a) the frequency;
 - (b) the maximum value of the generated e.m.f.;
 - (c) the value of the generated e.m.f. when the coil has rotated through 60° from the position of zero e.m.f.
7. A Capacitor of capacitance 79.5 μF is connected in series with a non-inductive resistance of 30 Ω across a 100V, 50Hz supply. Find (i) impedance (ii) current (iii) phase angle (iv) Equation for the instantaneous value of current.

The following questions carry 6 marks each (6 x 2 = 12 Marks)

8. Calculate the average and r.m.s. values of the current $i(t) = 4 + 10 \sin \omega t$ A.
9. A circuit consists of a resistance of 10 Ω, an inductance of 16 mH and a capacitance of 150 μF connected in series. A supply of 100 V at 50 Hz is given to the circuit. Find the current, power factor and power consumed by the circuit. Draw the phasor diagram.

Set ①

Presidency University Bengaluru
SURPRIZE QUIZ
Electrical Sciences

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

Please write the correct answer / choice in the space provided

Answer

- i. Linear resistors are those in which current produced is _____ proportional to the applied voltage.
- ii. The Norton resistance R_N is exactly equal to the _____.
- iii. The inductance of an iron-core coil decreases if
 - (a) the iron core is removed
 - (b) the length of the coil decreases
 - (c) the number of turns is decreased
 - (d) none of the above
- iv. The complex impedance of an inductor L at an angular frequency of ω is _____.
- v. The true power in single phase ac circuit is given by $VI \cos\Phi$. (True / False)

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SURPRIZE QUIZ
Electrical Sciences

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

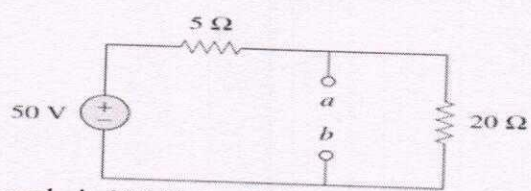
Set ②

Instruction to students: Do not write anything other than your Id. No. on the question paper.

Please write the correct answer / choice in the space provided

Answer

- i. Ohm is a unit of all of the following except (a) Inductance (b) resistance (c) inductive reactance (d) capacitive reactance
- ii. The Thevenin's resistance at terminals a and b in the figure shown is: (a) 20Ω (b) 25Ω (c) 15Ω (d) 4Ω .



- iii. The voltage of domestic ac supply is 230 Volts. This value represents rms value (True / False)
- iv. In a series RC circuit, when the frequency and the resistance are halved, the impedance: (a) is halved (b) is reduced to one-fourth (c) doubles (d) cannot be determined without values.
- v. Reactive Power (Q) of an a.c. circuit is given by the expression _____.

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 Electrical Sciences

Set 3

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|--|--------|
| i. | Resistivity of a material depends inversely on its length. | |
| ii. | Division of current in a parallel circuit is directly proportional to the _____ of the branches. | |
| iii. | Thevenin's theorem reduces a given complicated network to a simple parallel circuit. (True / False) | |
| iv. | The peak factor of a sinusoidally varying voltage is 1.414. (True / False) | |
| v. | The instantaneous power in ac circuits can be obtained by taking product of the instantaneous values of _____ and _____. (a) current, voltage (b) voltage, resistance (c) current, resistance (d) none of these. | |

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 Electrical Sciences

Set 4

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|--|--------|
| i. | Reciprocal of resistance is called _____. | |
| ii. | Norton's theorem reduces a given complicated network to a simple parallel circuit. (True / False) | |
| iii. | What will be the current taken by 100 μ F capacitor when it is connected across a 230 V, 50 Hz supply? (a) 4.56 A (b) 5.45 A (c) 6.34 A (d) 7.23 A | |
| iv. | The form factor is defined as the ratio _____. | |
| v. | The unit of apparent power (S) is given by _____. | |

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Electrical Sciences

Set A

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|--|---------------|
| i. | Which of the following quantity remains same in parallel circuit: (a) Voltage (b) Current and Voltage (c) Current (d) None of these | |
| ii. | Kilowatt-hour is the unit of _____ | |
| iii. | According to Thevenin's theorem, the equivalent resistance of the circuit as viewed from two terminals is found by replacing the voltage sources by _____ circuits. | |
| iv. | An alternating current is represented by the expression $i = 10 \sin(2\pi 60 t - \pi/6)$ amperes. What will be its instantaneous value at $t = 0$? (a) -8 A (b) -7 A (c) -6 A (d) -5 A | |
| v. | The admittance of a parallel ac circuit is the vector sum of its conductance and susceptance. (True / False) | |

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Electrical Sciences

Set B

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|--|---------------|
| i. | A voltmeter should be connected to a circuit in _____. (a) series-parallel (b) series (c) short form (d) parallel | |
| ii. | According to Thevenin's theorem, the equivalent resistance of the circuit as viewed from two terminals is found by replacing the current sources by _____ circuits. | |
| iii. | A circuit possesses an inductance of 1 H when a current through the coil is changing uniformly at the rate of 1 A / sec inducing a back e.m.f. of _____ volts in it. | |
| iv. | In pure resistive circuits the current and the voltage are _____ with each other. | |
| v. | The KVA of an a.c. circuit is given by the vector sum of KW and KVAR. (True / False) | |

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Electrical Sciences

Set 7

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|--|---------------|
| i. | Reciprocal of resistivity is _____ | |
| ii. | The nodal analysis is primarily based on the application of (a) Ohm's law (b) Kirchhoff's current law (c) Kirchhoff's voltage law (d) Both a and b | |
| iii. | 6 kHz sinusoidal voltage is applied to a series RC circuit. The frequency of the voltage across the resistor is (a) 12 kHz (b) 0 Hz (c) 18 kHz (d) 6 kHz | |
| iv. | In a phasor diagram, the phasors representing different alternating quantities are drawn normally to represent their (a) maximum value (b) r.m.s value (c) average value (d) none of the above | |
| v. | Negative power indicates power supplied. (True / False) | |

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Electrical Sciences

Set 8

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|---|---------------|
| i. | In Series Circuit, which of the following quantity remains same throughout the circuit: (a) Current and Voltage (b) Current (c) Voltage (d) None | |
| ii. | The loop analysis is primarily based on the application of (a) Ohm's law (b) Kirchhoff's current law (c) Kirchhoff's voltage law (d) Both a and b | |
| iii. | For a sinusoidal alternating current with maximum value of 25 A, its r.m.s and average values are respectively..... (a) 17.678 A , 15.93 A (b) 18.57 A, 16.82 A (c) 19.46 A , 17.71 A (d) 20.35 A , 18.69 A | |
| iv. | In a series R-L-C circuit, when the capacitive reactance becomes equal to the inductive reactance, the circuit behaves like a _____ circuit. | |
| v. | Positive power indicates power absorbed. (True / False) | |

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Electrical Sciences

set 9

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|--|---------------|
| i. | How are 500 ohm resistors connected so as to give an effective resistance of 750 ohm..... (a) Three resistance of 500 ohm each, in parallel (b) Three resistance of 500 ohm each, in series (c) Two resistance of 500 ohm each, in parallel (d) Two resistance of 500 ohm each, in parallel and the combination in series with another 500 ohm resistance. | |
| ii. | A voltage source with parallel resistance R transforms to a current source with R in series. (True / False) | |
| iii. | A 2 mH, a 3.3 mH, and a 0.2 mH inductor are connected in series. The total inductance is (a) 55 mH (b) 5.5 mH (c) less than 0.2 mH (d) less than 5.5 mH. | |
| iv. | The average value of a 12 V peak sine wave over one complete cycle is (a) 0 V (b) 1.27 V (c) 6.37 V (d) 7.64 V | |
| v. | Alternating voltages and currents can be represented by _____ rotating counter clockwise. | |

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Electrical Sciences

set 10

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|---|---------------|
| i. | A resistor is connected across a 50 V source. What is the current in the resistor if the color code is red, orange, orange, silver? (a) 2.17 mA (b) 2 mA (c) 214 mA (d) 21.4 mA | |
| ii. | The nodal analysis is primarily based on the application of (a) Ohm's law (b) Kirchhoff's current law (c) Kirchhoff's voltage law (d) Both a and b | |
| iii. | The Thevenin's equivalent voltage V_{Th} is the short-circuit voltage. (True / False) | |
| iv. | If frequency of the applied alternating voltage is doubled, the inductive reactance offered by a pure coil is also doubled. (True / False) | |
| v. | A sinusoidal current has an r.m.s. value of 14 mA. The peak-to-peak value is (a) 16 mA (b) 45.12 mA (c) 22.6 mA (d) 39.6 mA. | |

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Electrical Sciences

Set 11

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|--|---------------|
| i. | In parallel circuits, branch currents vary directly as the conductances of the branches. (True / False) | |
| ii. | Thevenin's theorem is used where it is easier to simplify a network in terms of _____ instead of currents. | |
| iii. | When the voltage across a capacitor is tripled, the stored charge (a) is cut to one-third (b) doubles (c) stays the same (d) triples | |
| iv. | To produce an 800 Hz sine wave, a four-pole generator must be operated at (a) 800 rps (b) 200 rps (c) 400 rps (d) 1,600 rps | |
| v. | The average power of a pure inductive load is _____ | |

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Set 12

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|--|---------------|
| i. | A Potentiometer is used for obtaining variable voltage from a given voltage supply. (True / False) | |
| ii. | Use of Norton's theorem requires the determination of short circuit _____ between the load terminals. | |
| iii. | Net power consumed by a pure inductive coil or pure capacitor is _____ | |
| iv. | A signal with a 400 s period has a frequency of (a) 2,500 Hz (b) 250 Hz (c) 25,000 Hz (d) 400 Hz | |
| v. | A capacitive load has a lagging power factor. (True / False) | |

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Set 13

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|---|---------------|
| i. | The colour band sequence of a resistor is Yellow, Violet, Orange and Gold. The range in which its value must lie so as to satisfy the tolerance specified is between (a) 44.66 K Ω and 49.35 K Ω (b) 44.65 K Ω and 49.35 K Ω (c) 44.65 K Ω and 49.36 K Ω (d) 45 K Ω and 49.34 K Ω . | |
| ii. | The formula $R_a = \frac{R_2 R_3}{R_1 + R_2 + R_3}$ given here for converting from delta to star is correct. (True / False) | |
| iii. | The time period of a sine wave of frequency 50 Hz is _____ second. | |
| iv. | In the complex plane, the number $4 + j3$ is located in the (a) second quadrant (b) third quadrant (c) first quadrant (d) fourth quadrant | |
| v. | At resonance, the inductive and capacitive reactances are equal. (True / False) | |

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Set 14

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|--|---------------|
| i. | A volt is the potential difference between two points when 1 joule of energy is used to move 1 coulomb of charge from one point to the other. (True / False) | |
| ii. | Capacitor acts as _____ for DC signal. | |
| iii. | If the rms voltage drop across a 15 K resistor is 16 V, the peak current through the resistor is (a) 15 mA (b) 10 mA (c) 1.5 mA (d) 1 mA | |
| iv. | The power factor of an a.c. circuit depends only on its resistance. (True / False) | |
| v. | At resonance, the _____ is equal to resistance. | |

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Electrical Sciences

Set 15

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|---|---------------|
| i. | If you wish to increase the amount of current in a resistor from 120 mA to 160 mA by changing the 24 V source, what should the new voltage setting be? (a) 32 V (b) 8 V (c) 3.2 V (d) 320 V | |
| ii. | Current division method is used in analyzing series circuits. (True / False) | |
| iii. | The r.m.s. value of a sinusoidal alternating current is _____ times its maximum value. | |
| iv. | In the complex plane, the number $14 - j5$ is located in the (a) first quadrant (b) second quadrant (c) third quadrant (d) fourth quadrant. | |
| v. | In ac circuits, product of rms volts and rms amperes gives power in volt amperes. (True / False) | |

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Set 16

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|--|---------------|
| i. | Conductors have _____ resistance. | |
| ii. | Voltage division method is used in analyzing series circuits. (True / False) | |
| iii. | When the plate area of a capacitor increases (a) the capacitance is unaffected (b) the capacitance increases (c) the capacitance decreases (d) the voltage it can withstand increases. | |
| iv. | When the frequency of the voltage applied to a series RC circuit is decreased, the impedance (a) decreases (b) remains the same (c) increases (d) doubles. | |
| v. | In ac circuits, product of rms volts and rms amperes gives power in watts. (True / False) | |

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Electrical Sciences

Set 17

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|---|--------|
| i. | Resistance of all pure metals ____ with increase in temperature. | |
| ii. | Three capacitors of value $8\mu\text{F}$, $16\mu\text{F}$ and $32\mu\text{F}$ are connected in series, the total capacitance will be (a) $32.7\mu\text{F}$ (b) $7.32\mu\text{F}$ (c) $4.57\mu\text{F}$ (d) $32\mu\text{F}$. | |
| iii. | The formula $R_c = \frac{R_1 R_2}{R_1 + R_2 + R_3}$ given here for converting from delta to star is correct. (True / False) | |
| iv. | A 6 kHz sinusoidal voltage is applied to a series RC circuit. The frequency of the voltage across the resistor is (a) 0 Hz (b) 18 kHz (c) 12 kHz (d) 6 kHz | |
| v. | The average value of the power in a capacitive circuit is ____ . | |

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Set 18

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|--|--------|
| i. | Resistance of carbon, electrolytes and insulating materials ____ with increase in temperature. | |
| ii. | The formula $R_2 = R_c + R_a + \frac{R_c R_a}{R_b}$ given here for converting from star to delta is correct. (True / False) | |
| iii. | The average value of a symmetrical sinusoidal alternating current is ____ . | |
| iv. | When the frequency of the source voltage decreases, the impedance of a parallel RC circuit (a) does not change (b) increases (c) decreases (d) decreases to zero | |
| v. | The average value of the power in an inductive circuit is ____ . | |

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Set 19

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|---|--------|
| i. | Which of the following will remain the same in all parts of a parallel circuit? (a) Voltage (b) Current (c) Power (d) Resistance | |
| ii. | The formula $R_b = \frac{R_2 R_3}{R_1 + R_2 + R_3}$ given here for converting from delta to star is correct. (True / False) | |
| iii. | Higher the frequency of an ac current, _____ the reactance offered by a capacitor. | |
| iv. | What is the angular difference between +j4 and -j4? (a) 180° (b) 90° (c) 30° (d) 270° | |
| v. | The reactive power is also called as imaginary power. (True / False) | |

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Set 20

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|---|--------|
| i. | Which of the following will remain the same in all parts of a series circuit? (a) Voltage (b) Current (c) Power (d) Resistance | |
| ii. | The formula $R_2 = R_c + R_b + \frac{R_c R_a}{R_c}$ given here for converting from star to delta is correct. (True / False) | |
| iii. | In a series R-L circuit, current always lags behind the applied voltage. (True / False) | |
| iv. | If $R=3\Omega$ is in series with $X_L=4\Omega$. Then the admittance of this circuit is $Y=$ _____ S. (a) 5 (b) 25 (c) 0.2 (d) 0.04 | |
| v. | For a certain load, the true power is 150 W and the reactive power is 125 VAR. The apparent power is (a) 25 W (b) 19.52 W (c) 195.2 W (d) 275 W | |

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Set 21

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|--|--------|
| i. | A collection of branches that form a closed path returning to the same node without going through any other nodes or branches twice is known as _____. | |
| ii. | A coil of negligible resistance and inductance of 0.5 H when connected to a 230 V, 50 Hz supply will draw a current of (a) 3.25 A (b) 2.36 A (c) 1.47 A (d) 0.58 A | |
| iii. | Alternating voltages and currents can be represented by rotating _____ counter clockwise. | |
| iv. | The capacitive reactance is directly proportional to frequency. (True / False) | |
| v. | If a load is purely inductive and the reactive power is 12 VAR, the apparent power is (a) 12 VA (b) 6 VA (c) 0 VA (d) 24 VA | |

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Set 22

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|---|--------|
| i. | The mesh analysis method uses Kirchoff's _____ Law. | |
| ii. | The process of replacing a voltage source in series with a resistor by a current source is in parallel with the same resistor, or vice versa is known as _____. | |
| iii. | Average value of a sinusoidal ac is slightly greater than its r.m.s. value. (True / False) | |
| iv. | A sine wave voltage is applied across an inductor. When the frequency of the voltage is decreased, the current (a) is decreased (b) does not change (c) momentarily goes to zero (d) is increased | |
| v. | In a pure capacitor, the voltage _____ current by 90° . | |

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set 23

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|--|--------|
| i. | The nodal analysis method uses Kirchoff's _____ Law. | |
| ii. | An inductor act as a short circuit for D.C. currents. (True / False) | |
| iii. | The _____ converts the circuit so that a single current source is divided among parallel branches. (a) Superposition theorem (b) Thevenin's theorem (c) Norton's theorem (d) Network theorem | |
| iv. | The Power- factor at resonance in R-L-C circuit is (a) Zero (b) Unity (c) 0.5 lagging (d) 0.5 leading. | |
| v. | The product of RMS values of voltage and currents with the cosine of the angle between them is called _____. | |

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set 24

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|---|--------|
| i. | Resistance of a wire is r ohms. The wire is stretched to double its length, then its resistance in ohms is (a) $r/2$ (b) $4r$ (c) $2r$ (d) $r/4$. | |
| ii. | The Thevenin's equivalent circuit of a network can be found by _____. (a) create a series circuit with the Thevenin's voltage and load resistor (b) select the resistor you wish to know the current through (c) open all of the sources in the circuit (d) close all of the current sources in the circuit. | |
| iii. | A leading alternating quantity is one which achieves its maximum or zero value first. (True / False) | |
| iv. | Total current drawn by a parallel ac circuit is the _____ sum of branch currents. | |
| v. | The product of RMS values of voltage and currents with the sine of the angle between them is called _____. | |

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set 25

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|---|--------|
| i. | Non-linear resistors do not obey Ohm's law. (True / False) | |
| ii. | The following values are found by using Norton's theorem ($R_N = 2.8 \Omega$, $I_N = 5 \text{ A}$). The converted Thevenin's values will be _____. (a) $R_{TH} = 2.8 \Omega$, $V_{TH} = 14 \text{ V}$ (b) $R_{TH} = 2.8 \Omega$, $V_{TH} = 0 \text{ V}$ (c) $R_{TH} = 14 \Omega$, $I_{TH} = 5 \text{ A}$ (d) $R_{TH} = 2.8 \Omega$, $I_{TH} = 0 \text{ A}$ | |
| iii. | The r.m.s. value of sinusoidal 100 V peak to peak is _____ volt. (a) $100 / \sqrt{2}$ (b) $50 / \sqrt{2}$ (c) 50 (d) 100 | |
| iv. | In a series R-C circuit, current always lags behind the applied voltage. (True / False) | |
| v. | Power factor is given by the ratio of circuit resistance and _____. | |

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Electrical Sciences

set 26

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|--|--|--------|
| i. | Which of the following quantity remains same in series circuit: (a) Voltage (b) Current and Voltage (c) Current (d) None of these | |
| ii. | The Norton's equivalent current I_N is obtained by open circuiting the load resistor terminal. (True / False) | |
| iii. | Induced e.m.f. can be either mutually induced or statically-induced. (True / False) | |
| iv. | In ac circuit the product of voltage and current is known as (a) Power (b) Real power (c) Resistive power (d) Apparent power. | |
| v. | Impedance of an R-L circuit is given by the algebraic sum of its resistance and _____. | |

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Electrical Sciences

Set 27

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|---|---------------|
| i. | Parallel grouping of cells is employed when increased e.m.f is required. | |
| ii. | The unit of inductance is (a) Ohm. (b) Mho. (c) Farad. (d) Henry. | |
| iii. | When converting from a current source to a voltage source, the _____ will remain the same. (a) current (b) voltage (c) no load current (d) resistance | |
| iv. | Use of Thevenin's theorem requires the determination of open circuit _____ between the load terminals. | |
| v. | The formula for quality factor involving capacitance and resistance is given by _____. | |

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Electrical Sciences

Set 28

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | | Answer |
|---|---|---------------|
| i. | Kirchhoff's laws make use of branch currents. | |
| ii. | Norton's theorem is used where it is easier to simplify a network in terms of _____ instead of voltages. | |
| iii. | In an R - L - C circuit, the phase of the current with respect to the circuit voltage will be _____. (a) Leading (b) Same (c) Lagging. (d) Depends upon the value of L and C. | |
| iv. | The power factor of a purely resistive circuit is (a) zero (b) unity (c) lagging (d) leading | |
| v. | The formula for quality factor involving inductance and resistance is given by _____. | |

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set 29

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | Answer |
|---|--------|
| i. The combined resistance of two equal resistors connected in parallel is equal to (a) One half the resistance of one resistor (b) Twice the resistance of one resistor (c) Four times the resistance of one resistor (d) One fourth the resistance of one resistor. | |
| ii. Superposition theorem can be applied to those circuits which contain voltage sources only. | |
| iii. The formula for capacitive reactance is given as _____. | |
| iv. Admittance of an ac circuit is given by the _____ of its impedance. | |
| v. The power factor of a dc circuit is _____. | |

Presidency University Bengaluru
SURPRIZE QUIZ
Electrical Sciences

set 30

Id. No.....

Section No.....

Maximum Marks: 05

Time: 10 Minutes

Instruction to students: Do not write anything other than your Id. No. on the question paper.

| Please write the correct answer / choice in the space provided | Answer |
|---|--------|
| i. When a low resistance is connected in parallel with a high resistance, the combined resistance is (a) Always more than the high resistance (b) Always less than the low resistance (c) Always between the high resistance & low resistance (d) Either lower or higher than low resistance depending on the value of high resistance. | |
| ii. While applying Kirchhoff's laws, flow of branch currents may be assumed in any direction we like. (True / False) | |
| iii. The Thevenin's equivalent voltage V_{Th} is the open-circuit voltage. (True / False) | |
| iv. In an ac circuit, the ratio of kW / kVA represents (a) Power factor (b) Load factor (c) Form factor (d) Diversity factor. | |
| v. The formula for resonant frequency is given as _____. | |