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National Testing Agency

Question Paper Name :	Fundamental Concepts of Electri
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Actual Answer Key :	Yes

Fundamental Concepts of Electricity

Group Number :	1
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Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	140
Is this Group for Examiner? :	No

Fundamental Concepts of Electricity

Section Id :	89951412
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	70

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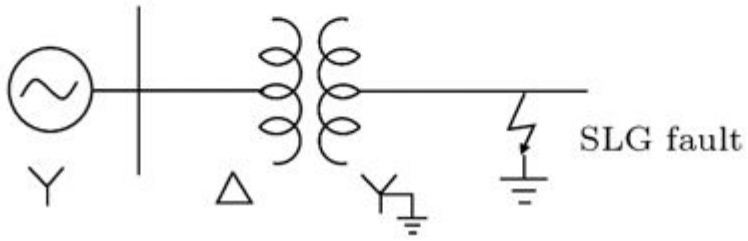
Number of Questions to be attempted :	70
Section Marks :	140
Display Number Panel :	Yes
Group All Questions :	Yes
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	89951421
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 899514941 Question Type : MCQ Option Shuffling : No Display Questi
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

For the system shown in figure, a single line to ground (SLG) fault occu
phase A on the transmission line side (star connection side). Due to this,
current is experienced on

A. All the 3 phases of the generator windings
B. Only on two phases of the generator windings
C. Only on one phase of the generator windings
D. None of the phases of the generator windings



Options :
8995143741. 1
8995143742. 2

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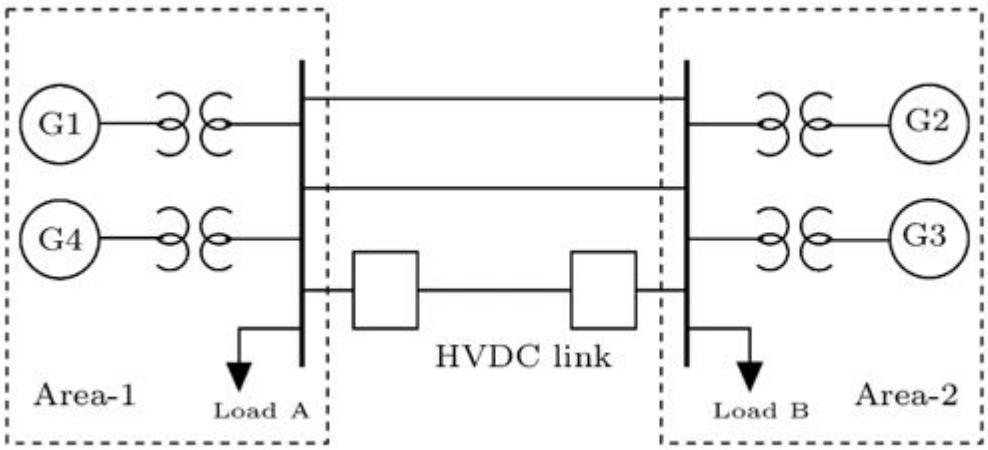
8995143743. 3
8995143744. 4

Question Number : 2 Question Id : 899514942 Question Type : MCQ Option Shuffling : No Display Questi
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

For a power system consisting of 2 areas connected by both AC tie lines ar HVDC link (see figure), under normal steady state operation, which o following is TRUE

A. A change in load B has no effect whatsoever in Area 1.
B. A change in generation at G1 has no effect whatsoever in Area 2.
C. The frequencies of Area-1 and Area-2 are the same
D. To carry out a power flow ("loadflow") study for this system we ne specify two slack buses, one in Area-1 and another in Area-2.



Options :
8995143745. 1

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8995143746. 2
8995143747. 3
8995143748. 4

Question Number : 3 Question Id : 899514943 Question Type : MCQ Option Shuffling : No Display Questi
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

Given a long, parallel, two wire system, where the diameter of the conducto very small compared to the spacing between the conductors. If the spa between the conductors is doubled then the capacitance of the system

A. Doubles
B. Marginally decreases
C. Marginally increases
D. Halves.

Options :
8995143749. 1
8995143750. 2
8995143751. 3
8995143752. 4

Question Number : 4 Question Id : 899514944 Question Type : MCQ Option Shuffling : No Display Questi
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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The $\frac{X}{R}$ ratio of a 150 km extra high voltage (EHV) over-head line lies in the r
of

A. 10-15
B. 1-2
C. 0.1-0.5
D. 60-100.

Options :
8995143753. 1
8995143754. 2
8995143755. 3
8995143756. 4

Question Number : 5 Question Id : 899514945 Question Type : MCQ Option Shuffling : No Display Questi
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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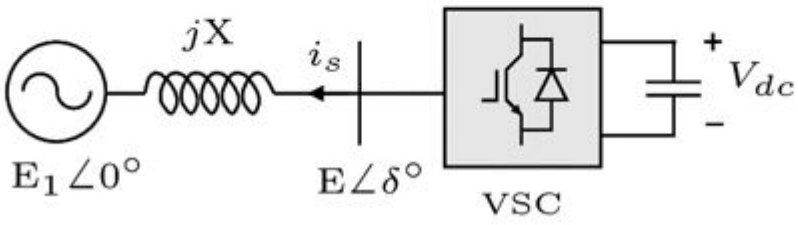
A three-phase bridge-connected voltage source converter (VSC) b
STATCOM is connected to a system via a transformer of reactance 0.1
shown in the figure. The STATCOM is operating with square wave swit
("six-pulse operation"). If the voltage of the system varies between 0.95 to 1.0
then calculate the maximum voltage across the dc capacitor if the STATCO
rated to ± 1.0 kA reactive current. You may neglect harmonics in your analysi
Hint: Line-line rms voltage for a square wave three-phase bridge convert
$\frac{\sqrt{6}}{\pi} V_{dc}$

A. 0.5π kV
B. 0.4π kV
C. 0.55π kV
D. 0.45π kV.



Options :
8995143757. 1
8995143758. 2
8995143759. 3
8995143760. 4

Question Number : 6 Question Id : 899514946 Question Type : MCQ Option Shuffling : No Display Questi

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Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

To achieve flat-voltage profile all along the line, the loading on the line must
(Note: SIL is surge impedance loading)

A. Less than SIL
B. Greater than SIL
C. Equal to SIL
D. Zero.

Options :
8995143761. 1
8995143762. 2
8995143763. 3
8995143764. 4

Question Number : 7 Question Id : 899514947 Question Type : MCQ Option Shuffling : No Display Questi
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

In a practical situation, a synchronous generator can be made to absorb rea
power by

A. Increasing the speed of the machine
B. Increasing the field current
C. Decreasing the speed of the machine
D. Decreasing the field current.

Options :
8995143765. 1
8995143766. 2
8995143767. 3
8995143768. 4

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Question Number : 8 Question Id : 899514948 Question Type : MCQ Option Shuffling : No Display Questi
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

In power systems, it is necessary to maintain the phase-angle difference acr
line well below 90^o during normal operation, so as

A. To have adequate stability margin
B. To improve transmission efficiency
C. To prevent over-voltage
D. To coordinate protection systems.

Options :
8995143769. 1
8995143770. 2
8995143771. 3
8995143772. 4

Question Number : 9 Question Id : 899514949 Question Type : MCQ Option Shuffling : No Display Questi
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

A line commutated thyristor bridge rectifier with only an inductor conne
across the dc link can be used :

A. To supply or absorb reactive power
B. Only to absorb reactive power
C. Only to supply reactive power
D. To supply or absorb real power

Options :
8995143773. 1

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8995143774. 2
8995143775. 3
8995143776. 4

Question Number : 10 Question Id : 899514950 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

If due to converter transformer problems, the -500 kV pole of a bipolar (± 500 kV) is outaged then the link is operated as a monopole (using the condu which is normally used for the -500 kV pole as the return path). Assuming the monopole is operated at the rated current level, the MW loss per MW po transmitted for such monopolar operation is

A. Equal to that for bipolar transmission at the rated current level
B. Two times of that for bipolar transmission at the rated current level
C. Four times of that for bipolar transmission at the rated current level
D. One fourth of that for bipolar transmission at the rated current level.

Options :
8995143777. 1
8995143778. 2
8995143779. 3
8995143780. 4

Question Number : 11 Question Id : 899514951 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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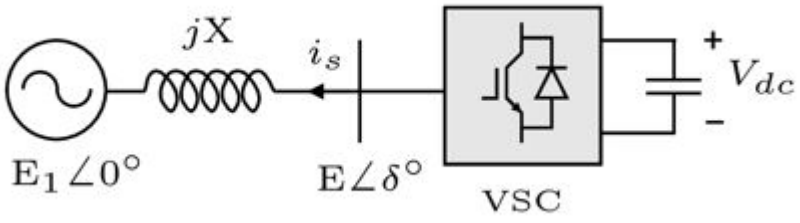
For a STATCOM which is supplying or absorbing reactive power only:

A. dc side current is practically a zero average ripple
B. dc side current is always negative
C. dc side current is always positive
D. dc side current is always zero.



Options :
8995143781. 1
8995143782. 2
8995143783. 3
8995143784. 4

Question Number : 12 Question Id : 899514952 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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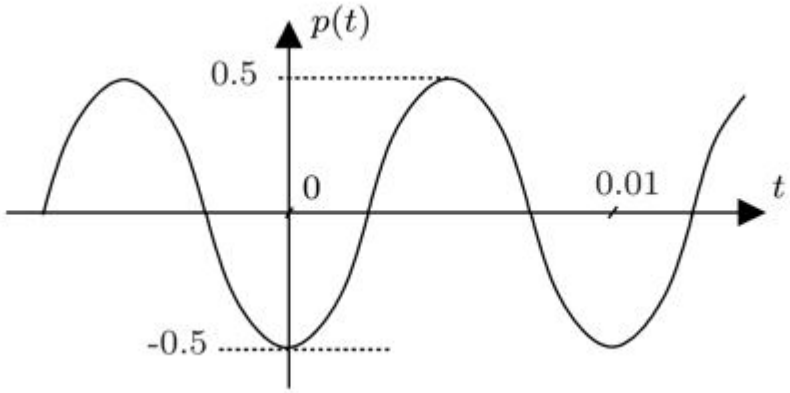
The waveform of instantaneous power in a single-phase ac circuit is shown be
The magnitudes of real and reactive power respectively are:

A. Zero and 0.5
B. $0.5/\sqrt{2}$ and $0.5/\sqrt{2}$
C. $1/\sqrt{2}$and $1/\sqrt{2}$
D. Zero and $0.5/\sqrt{2}$



Options :
8995143785. 1
8995143786. 2
8995143787. 3
8995143788. 4

Question Number : 13 Question Id : 899514953 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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In a balanced, star-connected three-phase circuit with phase to neutral volt
v_a, v_b and v_c, the rms value of phase-neutral voltage is V, rms value of line cu
i_a is I, and the phase angle between v_a and i_a is ϕ. The average value of (v
$v_c)i_a$ over a cycle is:

A. $\sqrt{3}VI \sin\phi$
B. $3VI \sin\phi$
C. $\sqrt{3}VI \cos\phi$
D. Zero

Options :
8995143789. 1
8995143790. 2
8995143791. 3
8995143792. 4

Question Number : 14 Question Id : 899514954 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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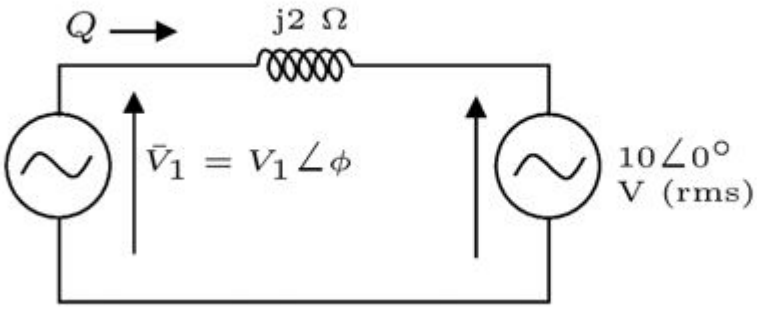
Consider two sinusoidal sources of frequency 50 Hz connected as shown in figure. There is no real power exchange between the two sources. If the source $\bar{V}_1$ has a reactive power output of 5.5 VAr, then $\bar{V}_1$ is :

A. 10+j0 V
B. 11+j0 V
C. 1-j1 V
D. 0+j11 V



Options :
8995143793. 1
8995143794. 2
8995143795. 3
8995143796. 4

Question Number : 15 Question Id : 899514955 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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For a single phase linear circuit at sinusoidal steady state, real power define
$P = Real\{\bar{V}.\bar{I}^*\}$ where $\bar{V}$ is voltage phasor and $\bar{I}$ is current phasor, denotes:

A. The average power drawn over a cycle
B. The instantaneous value of power
C. The peak value of power over a cycle
D. The rms value of power over a cycle.

Options :
8995143797. 1
8995143798. 2
8995143799. 3
8995143800. 4

Question Number : 16 Question Id : 899514956 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

In a single-phase ac circuit at steady-state, $\sum S_n = \sum P_n + j.\sum Q_n$ denotes the
injected power at a node by the branches incident on it. S is the complex powe
is the real power and Q is reactive power. Which of the following relations hol

A. $\sum S_n = 0$ always
B. $\sum P_n = 0$, but $\sum Q_n$ need not be zero
C. $\sum Q_n = 0$, but $\sum P_n$ need not be zero
D. $\sum S_n$ is never zero

Options :
8995143801. 1
8995143802. 2

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8995143803. 3
8995143804. 4

Question Number : 17 Question Id : 899514957 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

A three phase unbalanced star connected passive load is being supplied by a th
phase balanced 50 Hz supply. The total instantaneous three-phase power

A. Is constant
B. Pulsates at twice the supply frequency
C. Pulsates at half the supply frequency
D. Pulsates at the supply frequency.

Options :
8995143805. 1
8995143806. 2
8995143807. 3
8995143808. 4

Question Number : 18 Question Id : 899514958 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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A current transformer is used as a part of a current measurement device. connected in series with an ac power circuit and can step down current measurable levels, besides providing isolation to the measurement circuits. W of the following is TRUE?

A. The load impedance on the measurement circuit side of the winding sh be very small
B. The current transformer should practically be an open circuit on measurement circuit side
C. Short circuiting the winding on the measurement side will damage power circuit and the current transformer
D. The resistance and leakage reactance of the current transformer designed to be very large as compared to a power transformer.

Options :
8995143809. 1
8995143810. 2
8995143811. 3
8995143812. 4

Question Number : 19 Question Id : 899514959 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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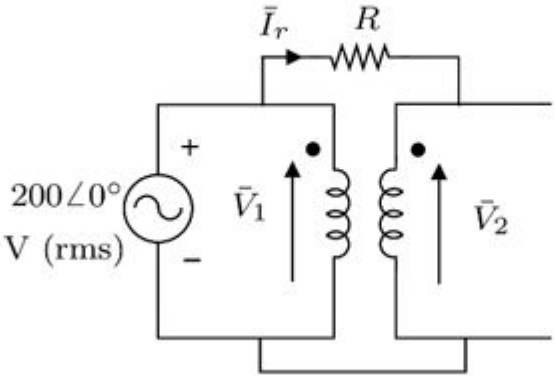
What is the current $\bar{I}_r$ through the resistor R, whose value is 100 Ω, in the ci
shown? Take $\bar{V}_1/\bar{V}_2 = \frac{1}{2}$.

A. $2\angle 0^o$ A

B. $6\angle 0^o$ A

C. $6\angle 180^o$ A

D. $2\angle 180^o$ A.



Options :
8995143813. 1
8995143814. 2
8995143815. 3
8995143816. 4

Question Number : 20 Question Id : 899514960 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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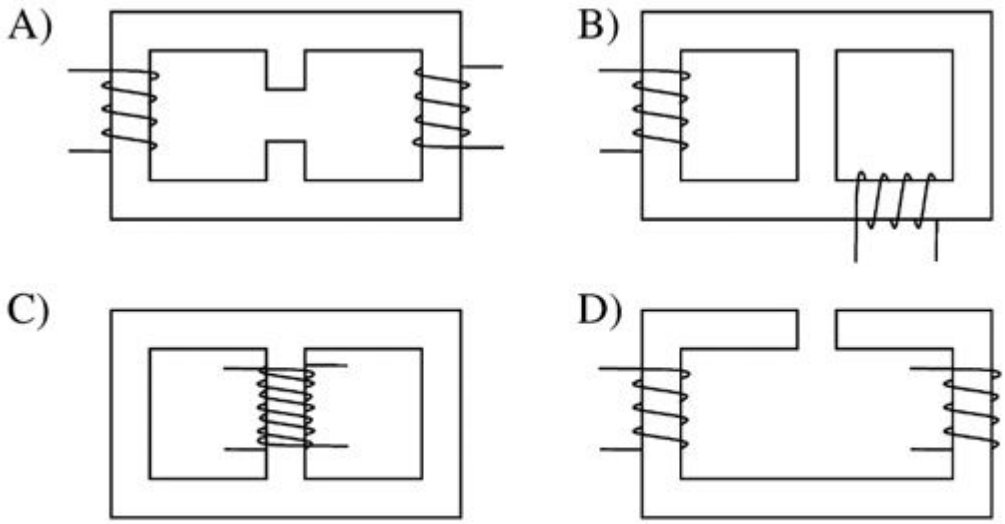
The behavior of which of the following magnetically coupled circuits is close an ideal transformer?

A. A
B. B
C. C
D. D.



Options :
8995143817. 1
8995143818. 2
8995143819. 3
8995143820. 4

Question Number : 21 Question Id : 899514961 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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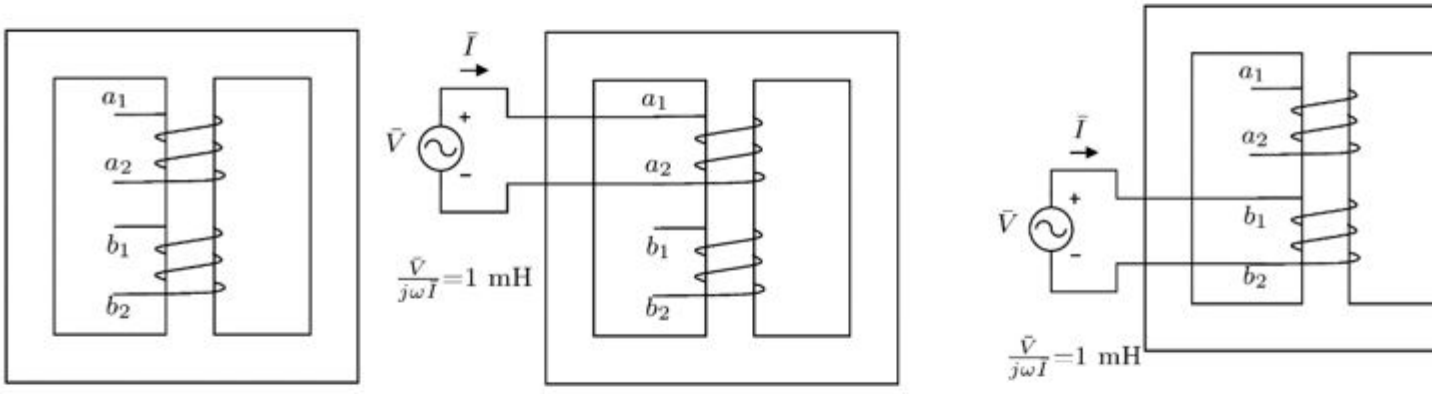
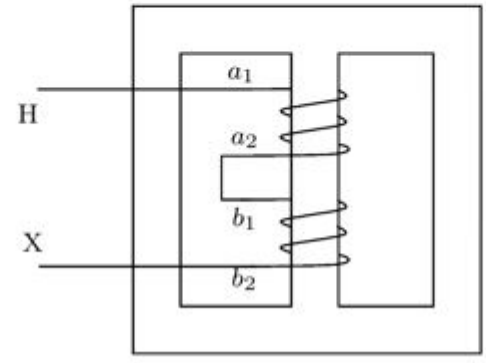
The inductance of each winding in Figure when excited individually (with other winding open) is found to be 1 mH. If the leakage flux is negligible, effective inductance as seen from the terminals HX as indicated in the ci below is

A. 0 mH
B. 2 mH
C. 3 mH
D. 4 mH.





Options :

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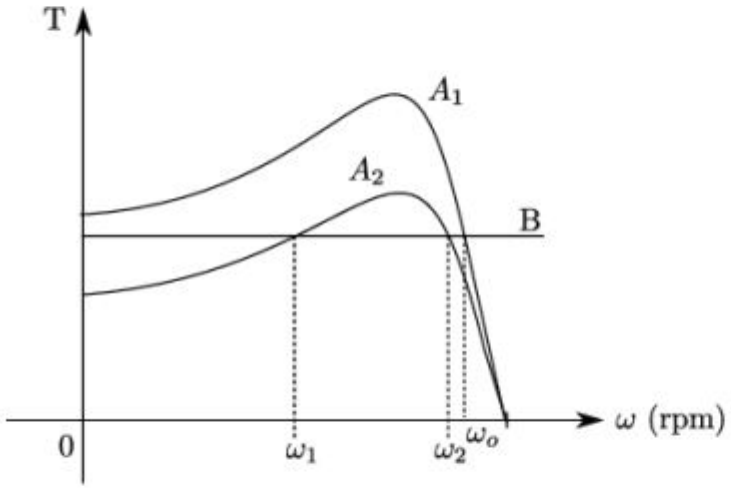
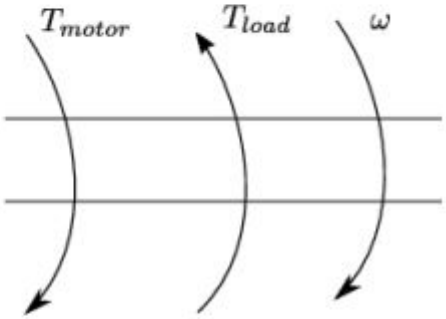
8995143822. 2
8995143823. 3
8995143824. 4

Question Number : 22 Question Id : 899514962 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

An induction motor is initially driving a constant torque load at a speed of ω_o r
The torque-speed characteristics of the motor and load are denoted by A_1 and B
respectively in the figure. Due to sudden drop in the ac voltage, the torque-spee
characteristics of the induction motor changes to A_2 as shown in the figure.





The motor speed

A. will settle at ω_1
B. will decrease and will settle at ω_2
C. will settle at ω_o
D. increase and not settle down

Options :

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8995143825. 1
8995143826. 2
8995143827. 3
8995143828. 4

Question Number : 23 Question Id : 899514963 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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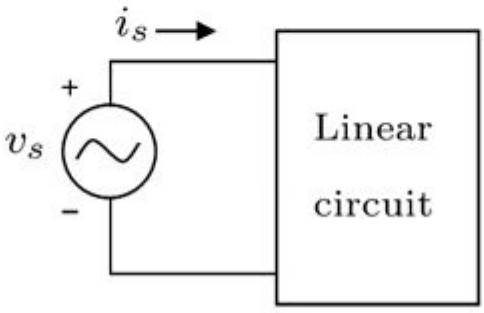
Consider a voltage source v_s connected to a linear circuit as shown in the figur
is observed that for $v_s = 100\sin(2\pi 50t + 30^o) + 20\cos(2\pi 100t)$ V, the cur
$i_s = 10\sin(2\pi 50t) + 0.2\sin(2\pi 100t + 45^o)$ A at steady-state operation. The
input voltage v_s, if the steady state current is $i_s =$
$5\sin(2\pi 50t) + 0.1\sin(2\pi 100t + 30^o)$ A, is:

$A.\ v_s = 50\sin(2\pi 50t + 30^o) + 10\sin(2\pi 100t - 15^o)$ V

$B.\ v_s = 50\sin(2\pi 50t - 60^o) + 10\sin(2\pi 100t + 75^o)$ V

$C.\ v_s = 50\sin(2\pi 50t + 30^o) + 10\sin(2\pi 100t - 60^o)$ V

$D.\ v_s = 50\sin(2\pi 50t + 30^o) + 10\sin(2\pi 100t + 75^o)$ V.



Options :
8995143829. 1
8995143830. 2
8995143831. 3

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8995143832. 4

Question Number : 24 Question Id : 899514964 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

The voltage v across a circuit element is given as $v = 5 + 10\sin(2\pi50$ $2\sin(2\pi100t + 10^o)$V and the current through the element is given as $\cos(2\pi50t + 45^o) + 0.4\sin(2\pi100t - 35^o)$A. The average power input to element is:

$A.$ $\frac{0.4}{\sqrt{2}}$ W

$B.$ $\frac{-4.6}{\sqrt{2}}$ W

$C.$ $\frac{4.6}{\sqrt{2}}$ W

$D.$ $\frac{10.4}{\sqrt{2}}$ W.

Options :
8995143833. 1
8995143834. 2
8995143835. 3
8995143836. 4

Question Number : 25 Question Id : 899514965 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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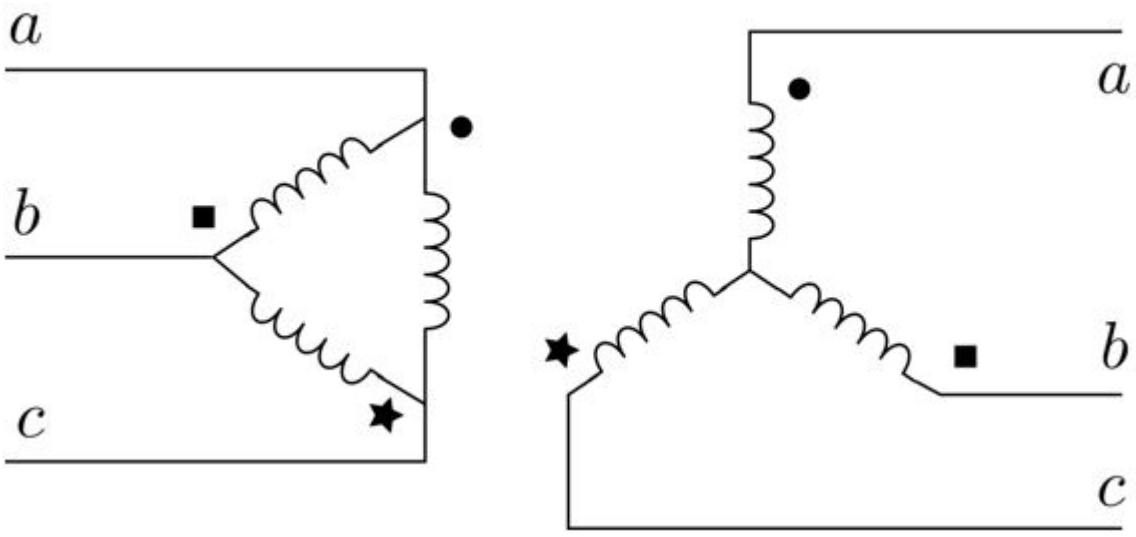
Consider a delta-star connected three-phase transformer as shown in the figur the balanced, three phase voltage applied to the delta winding has the p sequence *a-c-b* then the three phase line-line voltages on the star side lag corresponding voltages on the delta side by

A. -90^o
B. $+150^o$
C. -30^o
D. $+30^o$.



Options :
8995143837. 1
8995143838. 2
8995143839. 3

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8995143840. 4

Question Number : 26 Question Id : 899514966 Question Type : MCQ Option Shuffling : No Display Quest Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

Three units of single-phase transformers are connected to form a delta-star th phase transformer of 110 kV/11 kV. The transformer supplies at 11 kV a load MW at 0.8 power factor lagging to a nearby plant. Neglect the transfo leakages and losses. The ratio of phase winding currents in the delta side and side is

A. $1:10\sqrt{3}$

B. $10\sqrt{3}:1$

C. $1:10$

D. $\sqrt{3}:10.$

Options :
8995143841. 1
8995143842. 2
8995143843. 3
8995143844. 4

Question Number : 27 Question Id : 899514967 Question Type : MCQ Option Shuffling : No Display Quest Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

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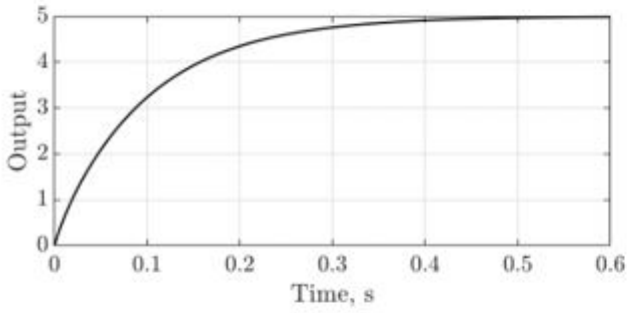
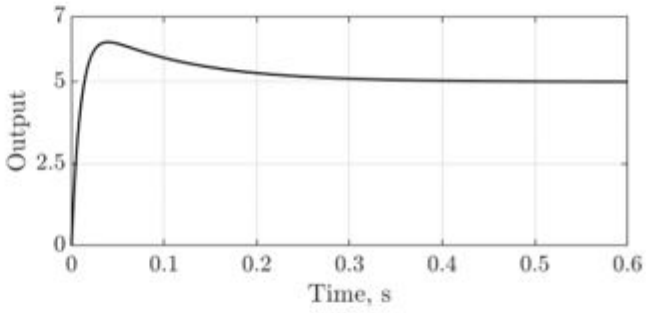
Which of the following plots depicts the unit step response of the follov transfer function: $G(s) = \frac{5(1-0.05s)}{(1+0.1s)(1+0.01s)}$?

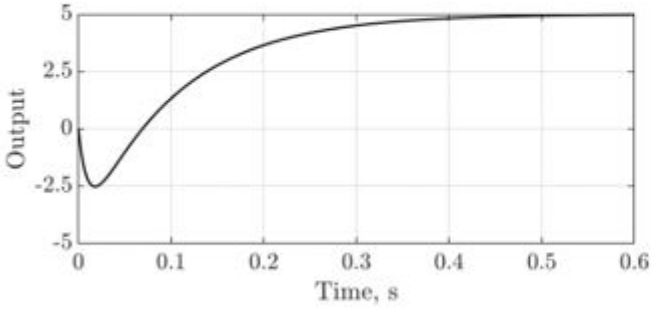
A. Option 1
B. Option 2
C. Option 3
D. Option 4.



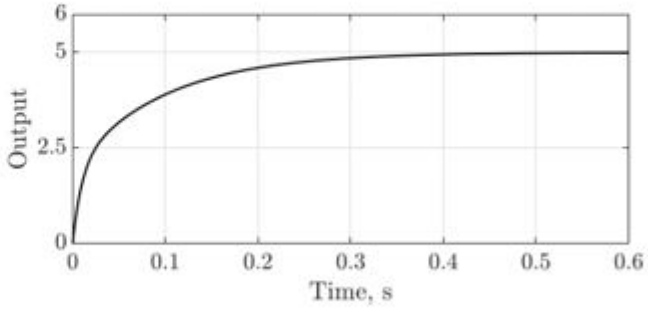
(a) Option 1



(b) Option 2



(c) Option 3



(d) Option 4

Options :
8995143845. 1
8995143846. 2
8995143847. 3
8995143848. 4

9/16/2020

Question Number : 28 Question Id : 899514968 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

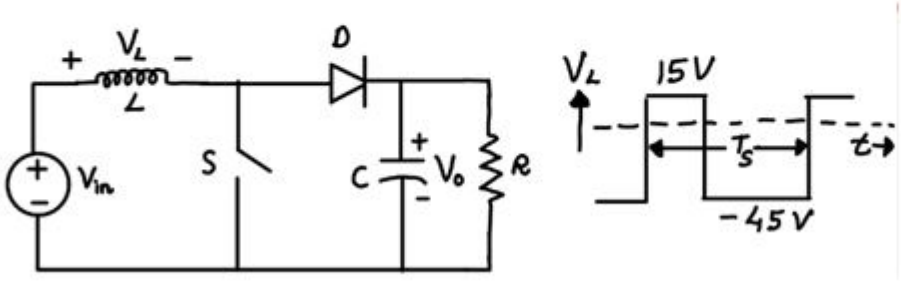
For the switching converter shown in the following figure, assume steady-s operation. Also assume that the components are ideal, the inductor curren always positive and continuous , and the switching period is T_s. The voltage as shown below. The duty cycle of the switch S is

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. $\frac{1}{4}$

D. $\frac{3}{4}$



Options :
8995143849. 1
8995143850. 2
8995143851. 3
8995143852. 4

9/16/2020

Question Number : 29 Question Id : 899514969 Question Type : MCQ Option Shuffling : No Display Quest Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

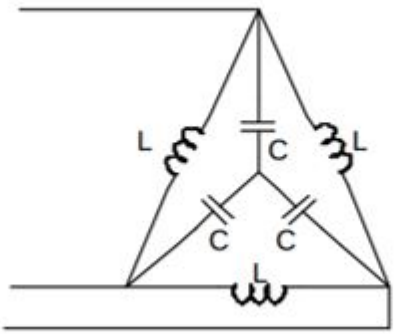
In the balanced three-phase 50 Hz circuit shown below, the value of inductance (L) is 1 mH. The value of the capacitance (C) for which all the currents are zero is:

A. 10.13 mF

B. 30.39 mF

C. 3.377 mF

D. Line currents cannot be made zero.



Options :

8995143853. 1

8995143854. 2

8995143855. 3

8995143856. 4

Question Number : 30 Question Id : 899514970 Question Type : MCQ Option Shuffling : No Display Quest Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

9/16/2020

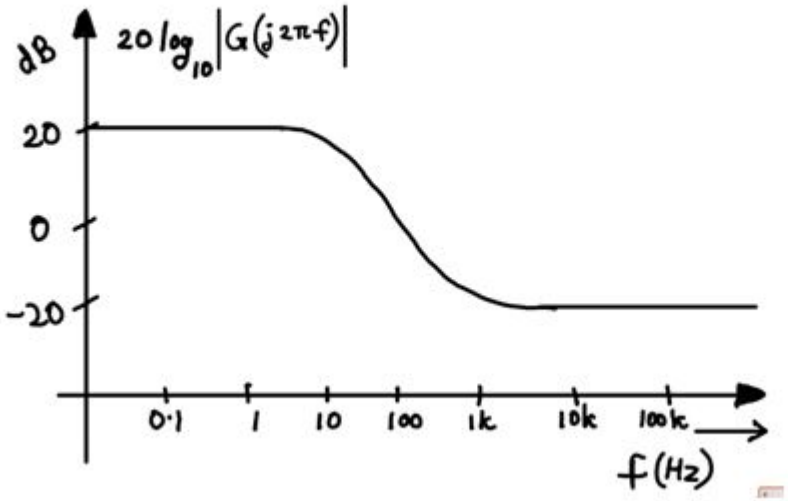
A Bode magnitude plot of the transfer function $G(s)$ is shown in the figure. transfer function best describing $G(s)$ is

A. $\frac{1000(s+10)}{s+1000}$

B. $\frac{10(s+10)}{s(s+1000)}$

C. $\frac{(s+1000)}{(s+10)}$

D. $\frac{(s+1000)}{10(s+10)}$



Options :
8995143857. 1
8995143858. 2
8995143859. 3
8995143860. 4

9/16/2020

Question Number : 31 Question Id : 899514971 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

Let $f(x)$ be a real, periodic function satisfying $f(T-x) = f(x)$, where T is fundamental period. The general form of its Fourier series representation w be:

A. $f(x) = a_o + \sum_{k=1}^{\infty} a_k \cos(kx)$

B. $f(x) = \sum_{k=1}^{\infty} b_k \sin(kx)$

C. $f(x) = a_o + \sum_{k=1}^{\infty} a_{2k} \cos(kx)$

D. $f(x) = \sum_{k=0}^{\infty} a_{2k+1} \sin(2k+1)x$

Options :
8995143861. 1
8995143862. 2
8995143863. 3
8995143864. 4

Question Number : 32 Question Id : 899514972 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

Consider a 30 km cable which is terminated on a 100 km long, lossless overl transmission line as shown in the figure. The overhead transmission line and cable are rated for the same nominal voltage. The parameters of the system ar follows:

Overhead transmission line: $x_L = 0.488\ \Omega/\text{km}$, $b_c = 3.371\ \mu\text{S/km}$

Cable: $x_L = 0.3388\ \Omega/\text{km}$, $b_c = 245.6\ \mu\text{S/km}$.

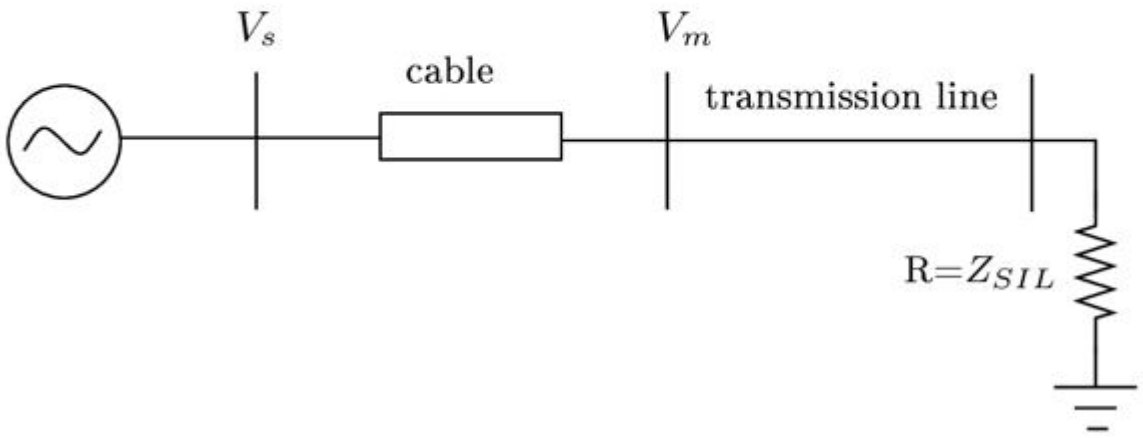
If the transmission line is terminated by a resistance equal to character impedance of the overhead transmission line (Z_{SIL}) then the voltage V_m at junction of the cable and the transmission line when V_s is 230 kV is

A. $V_m < 230$ kV

B. $V_m = 230$ kV

C. $V_m = 0$ kV

D. $V_m > 230$ kV.



Options :

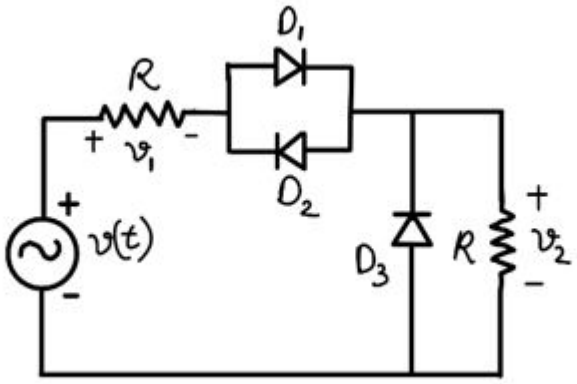
9/16/2020

8995143865. 1
8995143866. 2
8995143867. 3
8995143868. 4

Question Number : 33 Question Id : 899514973 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

For the circuit shown in the figure below, assume that diodes D1, D2 and D3 ideal. If $v(t) = 2\pi \sin(100\pi t)$, then the dc component of voltage v_2 is

A. 0 V
B. 2 V
C. 2π V
D. 1 V.



Options :
8995143869. 1
8995143870. 2
8995143871. 3
8995143872. 4

9/16/2020

Question Number : 34 Question Id : 899514974 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

Consider a linear time-invariant system with transfer function $H(s) = \frac{1}{s+1}$. If input is $\cos(t)$ and the steady state output is $A\cos(t+\alpha)$, then the value of A α is

A. $\frac{1}{\sqrt{2}}, -45^o$

B. $\frac{1}{\sqrt{2}}, +45^o$

C. $\frac{1}{2}, -45^o$

D. $\frac{1}{2}, +45^o.$

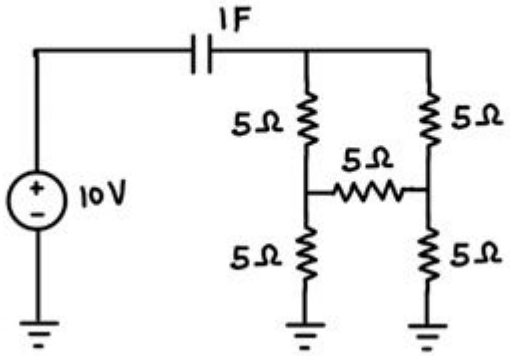
Options :
8995143873. 1
8995143874. 2
8995143875. 3
8995143876. 4

Question Number : 35 Question Id : 899514975 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

The initial charge in the 1 F capacitor present in the circuit shown is zero. *energy in joule transferred* from the dc source to the rest of the circuit until ste state condition is reached is

A. 50 J
B. 100 J
C. 200 J
D. 150 J.



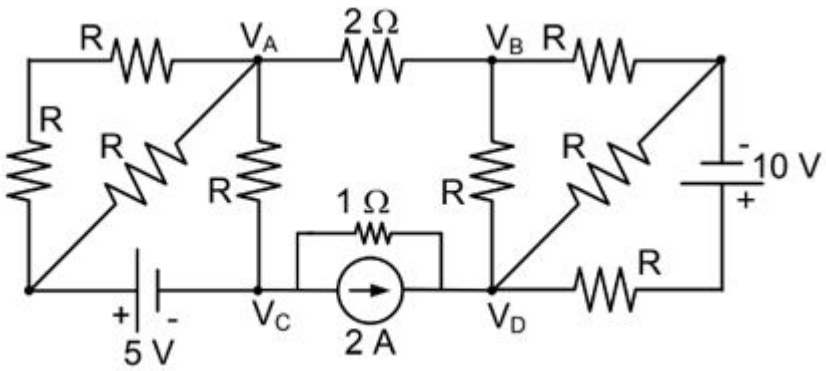
Options :
8995143877. 1
8995143878. 2
8995143879. 3
8995143880. 4

Question Number : 36 Question Id : 899514976 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

In the circuit given below, If $V_A - V_B = 6$ V, then $V_C - V_D$ is

A. -5 V
B. 2 V
C. 3 V
D. 6 V.



Options :
8995143881. 1
8995143882. 2
8995143883. 3
8995143884. 4

Question Number : 37 Question Id : 899514977 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

A 50 Hz synchronous generator is initially kept disconnected from a long loss transmission line which is kept open circuited at the receiving end. With the voltage held constant, the generator is connected to the transmission line. W of the following may be said about the steady-state voltage and the field curre the generator?

A. The magnitude of terminal voltage decreases, and the field current does change
B. The magnitude of terminal voltage increases, and the field current does change
C. The magnitude of terminal voltage decreases, and the field current incre
D. The magnitude of terminal voltage does not change, and the field cu decreases.

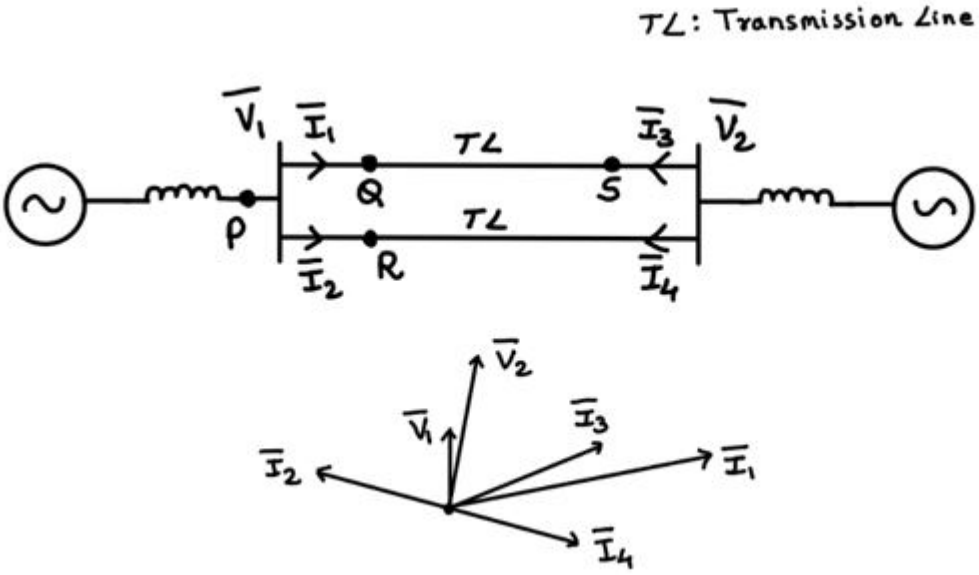
Options :
8995143885. 1
8995143886. 2
8995143887. 3
8995143888. 4

Question Number : 38 Question Id : 899514978 Question Type : MCQ Option Shuffling : No Display Quest Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

A sustained three-phase fault occurs in the power system shown in the figure. current and voltage phasors during the fault (on a common reference), after natural transients have died down, are as shown. Where is the fault located?

A. Location P
B. Location Q
C. Location R
D. Location S.



Options :
8995143889. 1
8995143890. 2
8995143891. 3
8995143892. 4

Question Number : 39 Question Id : 899514979 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

9/16/2020

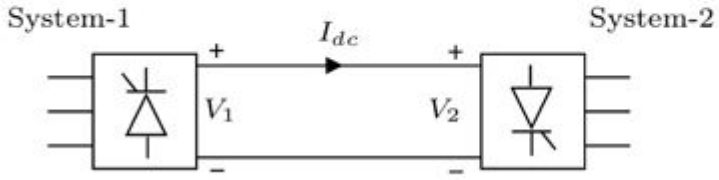
Consider an HVdc link which uses thyristor based line-commutated converters as shown in the figure. For a power flow of 750 MW from system-1 to system-2, the voltages at the two ends, and the current, are given by: V_1 = 500 kV, V_2 = 485 kV and I_{dc} = 1.5 kA. If the direction of power flow is to be reversed (that is, from system-2 to system-1) without changing the electrical connections, then which one of the following combinations is feasible?

A. V_1 = -500 kV, V_2 = -485 kV and I_{dc} = 1.5 kA

B. V_1 = -485 kV, V_2 = -500 kV and I_{dc} = 1.5 kA

C. V_1 = 500 kV, V_2 = 485 kV and I_{dc} = -1.5 kA

D. V_1 = -500 kV, V_2 = -485 kV and I_{dc} = -1.5 kA.



Options :

8995143893. 1

8995143894. 2

8995143895. 3

8995143896. 4

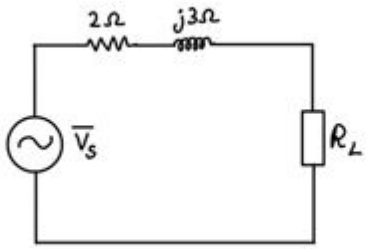
Question Number : 40 Question Id : 899514980 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

9/16/2020

The load resistance R_L such that maximum real power is transferred to R_L from the source is

A. 2 Ω
B. 3 Ω
C. 3.6 Ω
D. 5.5 Ω.



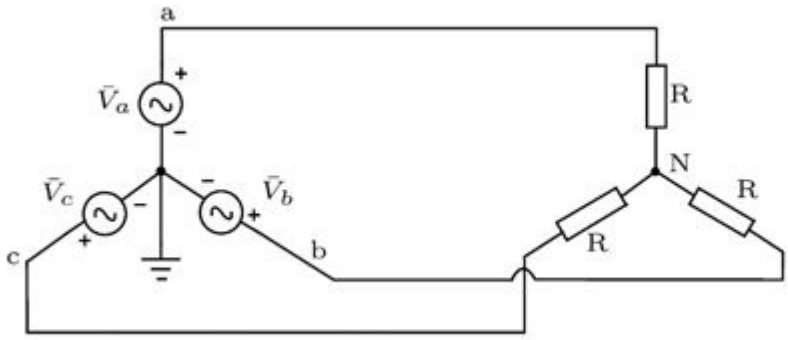
Options :
8995143897. 1
8995143898. 2
8995143899. 3
8995143900. 4

Question Number : 41 Question Id : 899514981 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

Consider a three-phase circuit as shown. The load is balanced whereas the source is unbalanced with the *rms phase voltages* as $\overline{V_a} = 10\angle 0^o$ V, $\overline{V_b} = 9\angle -115^o$ V and $\overline{V_c} = 10\angle 110^o$ V respectively. The magnitude of the rms voltage of the load's neutral point N with respect to the ground is

A. 0 V
B. 9.12 V
C. 1.01 V
D. 4.12 V



Options :
8995143901. 1
8995143902. 2
8995143903. 3
8995143904. 4

Question Number : 42 Question Id : 899514982 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

Let $\vec{F} = \nabla \times (\nabla V)$ where V is a scalar variable and $\nabla = \frac{\partial}{\partial x}\overrightarrow{a_x} + \frac{\partial}{\partial y}\overrightarrow{a_y} + \frac{\partial}{\partial z}\overrightarrow{a_z}$.

Let $R = \nabla.\left(\nabla \times \vec{A}\right)$, where $\vec{A}$ is a vector field, which of the following is TRUE?

A. Only $\vec{F}$ is zero always
B. Only R is zero always
C. Both $\vec{F}$ and R are zero always
D. None of these.

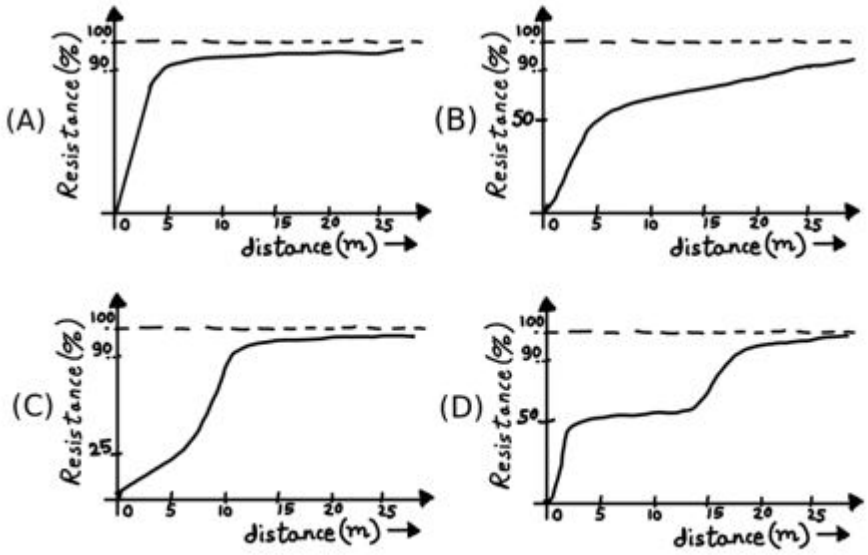
Options :
8995143905. 1
8995143906. 2
8995143907. 3
8995143908. 4

Question Number : 43 Question Id : 899514983 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

Which of the following curves indicate a typical variation of the resistance offered by earth as a function of the distance from the earthing electrode?

A. A
B. B
C. C
D. D.



Options :
8995143909. 1
8995143910. 2
8995143911. 3
8995143912. 4

Question Number : 44 Question Id : 899514984 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

Consider a system consisting of many synchronous generators and many loads. The synchronous generators are connected to each other by ac lines, and are operating in synchronism. In addition, an embedded HVdc link connects two nodes of this system. If changes are made to the power flow in the HVdc link via converter control, which of the following statements is TRUE? Neglect the effect of losses and load-voltage dependence.

A. The steady state frequency of the system will practically remain unchanged
B. The steady state frequency will increase significantly
C. The steady state frequency will decrease significantly
D. The steady state frequency will decrease or increase depending on the power flow direction.

Options :

8995143913. 1

8995143914. 2

8995143915. 3

8995143916. 4

Question Number : 45 Question Id : 899514985 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

9/16/2020

For the three-phase transformer as connected in the figure, the line voltage of the primary side (V_{ab}) leads that of the secondary side (V_{AB}) by

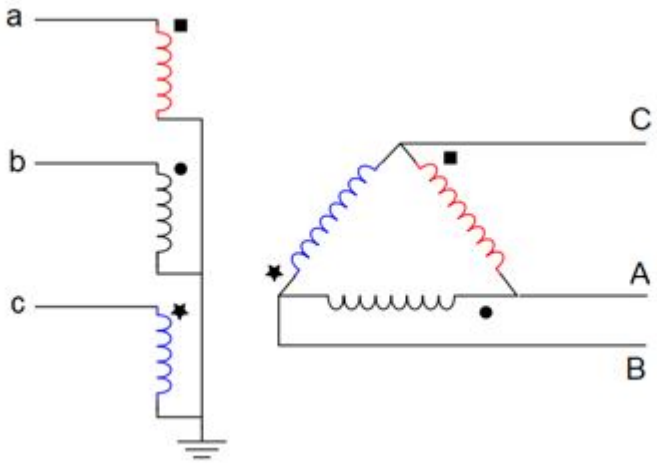
Note: phase sequence is a-b-c

A. -30^o

B. 150^o

C. 30^o

D. 90^o



Options :

8995143917. 1

8995143918. 2

8995143919. 3

8995143920. 4

Question Number : 46 Question Id : 899514986 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

9/16/2020

The rotor of a shunt connected DC machine is mechanically coupled to the rotor of a 50 Hz, three-phase, 4-pole induction machine. The DC machine is energized first and the machines are found to rotate at 1600 rpm. Subsequently the induction machine is connected to a 50 Hz, three-phase source with the phase sequence being consistent with the direction of rotation. The rotor speed of the machine will be

A. 1600 rpm
B. above 1600 rpm
C. between 1500 rpm and 1600 rpm
D. below 1500 rpm

Options :
8995143921. 1
8995143922. 2
8995143923. 3
8995143924. 4

Question Number : 47 Question Id : 899514987 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

A 50 MVA, 20 kV synchronous generator is supplying the rated load and it has been found that the field excitation E_{fd} required to achieve this in steady state is 100 V. The reference voltage V_{ref} has been set to 20 kV. If the field voltage is regulated using the following control strategy

$$E_{fd}(s) = \frac{0.2}{1 + 0.01s}\left(V_{ref}(s) - V_t(s)\right)$$

then the terminal voltage V_t in steady state will be

A. 19.5 kV
B. 30 kV
C. 20 kV
D. 20.01 kV

Options :

9/16/2020

8995143925. 1
8995143926. 2
8995143927. 3
8995143928. 4

Question Number : 48 Question Id : 899514988 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

An inter-connected AC system consists of two synchronous generators and passive loads which are supplied through transmission lines. Initially, the generation is set such that there is no generation-load mismatch. Generator 1 is equipped with a droop based governor while generator 2 has an integral governor. The load in the system is increased by 1%. Assuming that the system reaches an acceptable equilibrium, at steady state

A. Generator 1 will provide the extra load and generator 2 output will be unchanged
B. Generator 1 output will be unchanged and generator 2 will provide the extra load
C. Generator 1 and generator 2 will partially share the load and both will increase their outputs
D. None of the generator outputs will change.

Options :
8995143929. 1
8995143930. 2
8995143931. 3
8995143932. 4

Question Number : 49 Question Id : 899514989 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

Which of the following statements regarding the laws describing the behaviour of electric and magnetic fields is TRUE?

A. $\oint \vec{B} . d\vec{L} = \varepsilon_o I$ is applicable for static magnetic field conditions

B. $F = \frac{1}{4\pi\varepsilon} \frac{Q_1 Q_2}{r^2}$ is applicable for both static and dynamic electric fields

C. $\nabla \times \vec{E} = 0$ is applicable for dynamic electric and magnetic fields

D. $\nabla . \vec{J} = 0$ is applicable only for static electric fields.

Options :

8995143933. 1

8995143934. 2

8995143935. 3

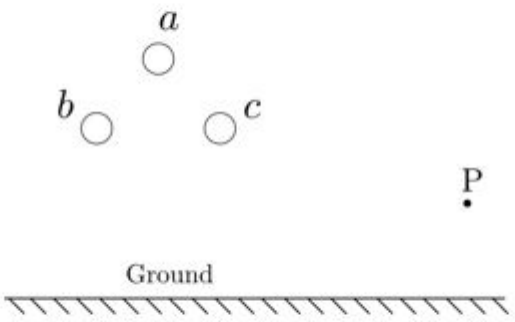
8995143936. 4

Question Number : 50 Question Id : 899514990 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

9/16/2020

Consider a three-phase overhead transmission line with balanced three-phase voltages. The position of the phase conductors with respect to ground are as shown in the figure below. Which of the following statements is TRUE regarding the electric field $\vec{E}$ at the point P shown in the figure?



A. $\vec{E} = 0$

B. Both magnitude and direction of $\vec{E}$ vary with time

C. Magnitude of $\vec{E}$ varies with time but direction of $\vec{E}$ is constant

D. Magnitude of $\vec{E}$ is constant but direction of $\vec{E}$ varies with time.

Options :

8995143937. 1

8995143938. 2

8995143939. 3

8995143940. 4

Question Number : 51 Question Id : 899514991 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

9/16/2020

The no load power factor of an induction machine is _____ that of a transformer because of larger _____. Fill in the blanks appropriately from following options

A. Greater than, air gap
B. Less than, winding turns
C. Greater than, resistance
D. Less than, air gap

Options :
8995143941. 1
8995143942. 2
8995143943. 3
8995143944. 4

Question Number : 52 Question Id : 899514992 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

If the voltage applied to a 415 V rated capacitor drops by 10%, its VAr (reactive power) output drops by

A. 23%
B. 87%
C. 19%
D. 10%

Options :
8995143945. 1
8995143946. 2
8995143947. 3
8995143948. 4

Question Number : 53 Question Id : 899514993 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

While analyzing power system networks, transformers are generally modelled as a reactance in series with the line to which it is connected. This reactance corresponds to the

A. Magnetizing reactance of the transformer
B. Leakage reactance of the transformer
C. Reactance of the load connected to the transformer
D. Sum of the magnetizing reactance and leakage reactance of the transformer

Options :
8995143949. 1
8995143950. 2
8995143951. 3
8995143952. 4

Question Number : 54 Question Id : 899514994 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

A power system has two synchronous generators. The governor-turbine characteristics corresponding to the generators are

$$P_1 = 50(50 - f) \text{ and } P_2 = 100(51 - f)$$

where f denotes the system frequency in Hz, and P_1 and P_2 are, respectively, the power outputs (in MW) of turbines 1 and 2. Assuming the generators and transmission network to be lossless, the system frequency for a total load of 400 MW is

A. 47.5 Hz
B. 48.0 Hz
C. 48.5 Hz
D. 49.0 Hz

Options :
8995143953. 1
8995143954. 2
8995143955. 3

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8995143956. 4

Question Number : 55 Question Id : 899514995 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

A value of rms current (at ~50 Hz) flowing though the human body, which can cause a painful shock, but may not lead to loss of muscular control is

A. 10 mA
B. 100 mA
C. 1 A
D. 10 A

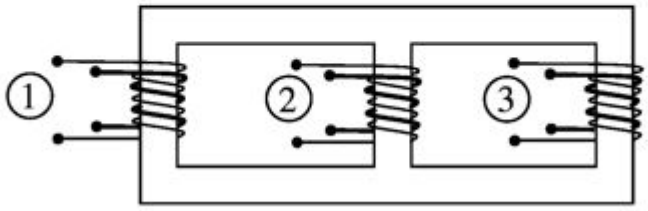
Options :
8995143957. 1
8995143958. 2
8995143959. 3
8995143960. 4

Question Number : 56 Question Id : 899514996 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

Consider a three-phase, three limb, star-star transformer with the primary and secondary of each phase wound on a limb as shown in the figure. If the secondary windings are kept open and identical sinusoidal voltages are applied to all the three primary windings at the same time, then:

A. The currents drawn will be much lower than if balanced three phase sinusoidal voltages (of the same magnitude) were to be applied
B. The current drawn will be much higher than if balanced three phase sinusoidal voltages (of the same magnitude) were to be applied
C. The current drawn will be equal to the currents if balanced three phase sinusoidal voltages (of the same magnitude) were to be applied
D. The current drawn will be slightly lower than if balanced three phase sinusoidal voltages (of the same magnitude) were to be applied



Options :
8995143961. 1
8995143962. 2
8995143963. 3
8995143964. 4

Question Number : 57 Question Id : 899514997 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

The wave propagation velocity in a cable is

A. greater than that of an overhead line

B. lesser than that of an overhead line

C. equal to that of an overhead line

D. equal to the speed of light in vacuum.

Options :
8995143965. 1
8995143966. 2
8995143967. 3
8995143968. 4

Question Number : 58 Question Id : 899514998 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

The simplest representation that can accurately capture the sinusoidal steady state behavior of a 30 km overhead transmission line at 50 Hz, under various loading conditions is

A. a lumped parameter series R-L model

B. a lumped parameter π connected R-L and C model

C. distributed parameter R-L and C model

D. a lumped parameter T connected R-L and C model

Options :
8995143969. 1
8995143970. 2
8995143971. 3
8995143972. 4

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Question Number : 59 Question Id : 899514999 Question Type : MCQ Option Shuffling : No Display Quest
Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

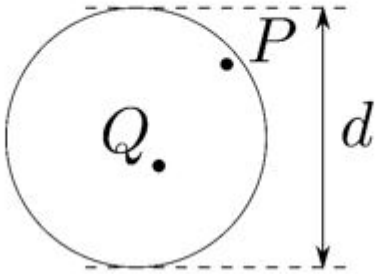
The cross-sectional view of a copper conductor carrying a 50 Hz current is shown in the figure where $d = 6$ cm. Let J_P and J_Q be the peak values of the current density vectors at the points P (close to the surface) and Q (well inside the conductor) respectively. Which of the following statements is TRUE?

A. $J_P > J_Q$

B. $J_P < J_Q$

C. $J_P = J_Q$

D. $J_Q = \sqrt{6}\ J_P$



Options :
8995143973. 1
8995143974. 2
8995143975. 3
8995143976. 4

Question Number : 60 Question Id : 8995141000 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

The electric field intensity at a point in charge-free space is given by $E = 5xa_x - kya_y + 2a_z$ Wb/m^2. The value of constant k must be equal to:

A. -5
B. +5
C. +0.2
D. -0.2

Options :
8995143977. 1
8995143978. 2
8995143979. 3
8995143980. 4

Question Number : 61 Question Id : 8995141001 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

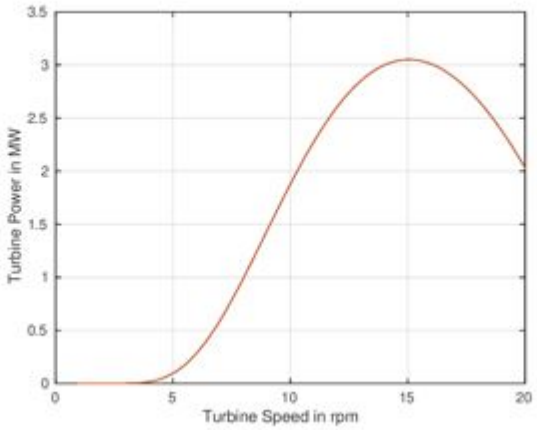
A wind turbine-generator system consists of a wind turbine whose characteristic for certain wind speed is shown in the figure. The turbine is coupled to a four-pole, 50 Hz squirrel cage induction generator through a gearbox which has a gear ratio of 1:80. If the induction generator is connected to a 50 Hz AC grid, the approximate power it delivers is:

A. 1.6 MW

B. 2.0 MW

C. 2.4 MW

D. 3.1 MW



Options :

8995143981. 1

8995143982. 2

8995143983. 3

8995143984. 4

Question Number : 62 Question Id : 8995141002 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

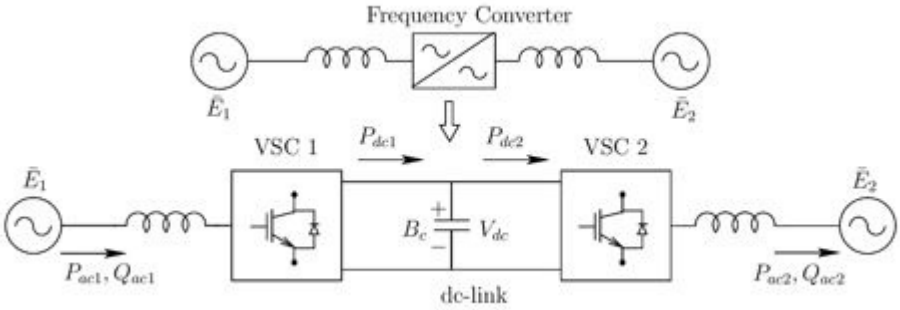
A frequency converter is made up of back to back connected voltage source converters as shown in the figure. If the converters are assumed to be lossless, then under steady state, which of the following statements is FALSE:

A. $P_{ac1} = P_{dc1}$ and $P_{ac2} = P_{dc2}$

B. $P_{dc1} = P_{dc2}$

C. Q_{ac1} and Q_{ac2} are independently controllable

D. P_{ac1} and P_{ac2} are independently controllable



Options :

8995143985. 1

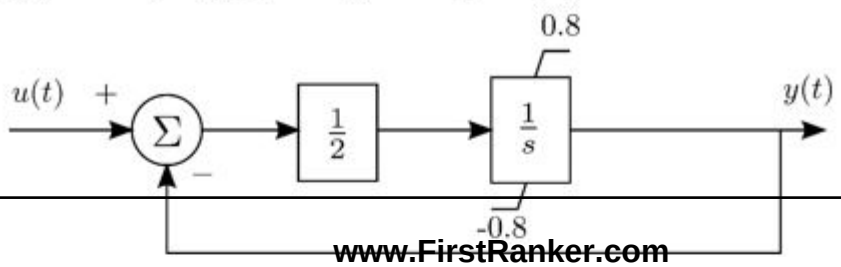
8995143986. 2

8995143987. 3

8995143988. 4

Question Number : 63 Question Id : 8995141003 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

A system is shown in the figure. If the integrator is equipped with a hard limiter (windup type), the output $y(t)$ for a pulse input $u(t)$ is



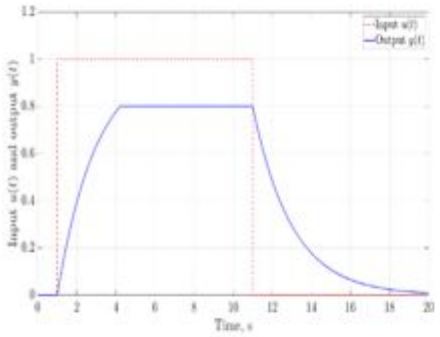
9/16/2020

A. (I)

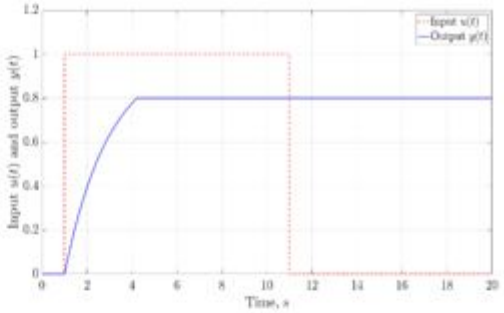
B. (II)

C. (III)

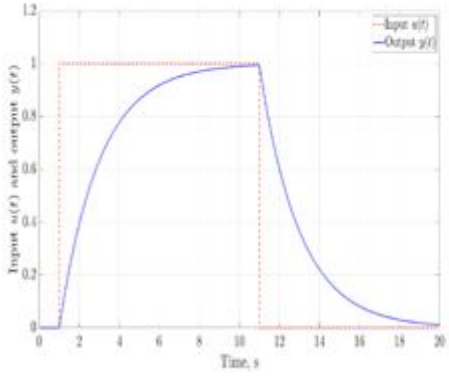
D. (IV)



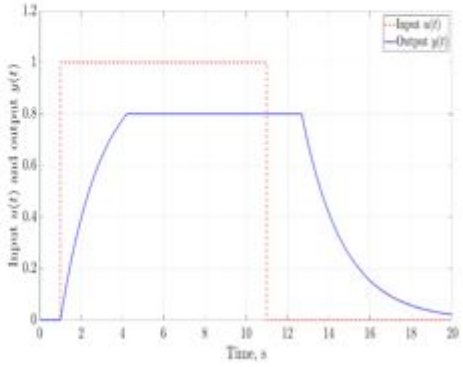
(I)



(II)



(III)



(IV)

Options :

8995143989. 1

8995143990. 2

8995143991. 3

8995143992. 4

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Question Number : 64 Question Id : 8995141004 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

The frequency of the signal $x(t) = \sin(2\pi 30t + 10^o) - 5\cos(2\pi 40t) + 3\sin(2\pi 100t + 30^o)$ is

A. 10 Hz

B. 30 Hz

C. 100 Hz

D. 600 Hz

Options :
8995143993. 1
8995143994. 2
8995143995. 3
8995143996. 4

Question Number : 65 Question Id : 8995141005 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

The ferromagnetic core of a transformer has negligible hysteresis and core loss. If the transformer is excited with a sinusoidal voltage source of 50 Hz, then the fundamental component of the current drawn by the transformer lags the voltage by

A. 180^o

B. 0^o

C. 90^o

D. -90^o

Options :
8995143997. 1

9/16/2020

8995143998. 2
8995143999. 3
8995144000. 4

Question Number : 66 Question Id : 8995141006 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

Which of the following connections is least safe for a broken neutral condition?

A. A

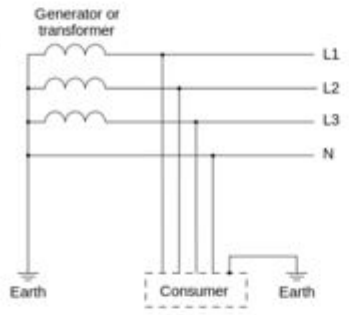
B. B

C. C

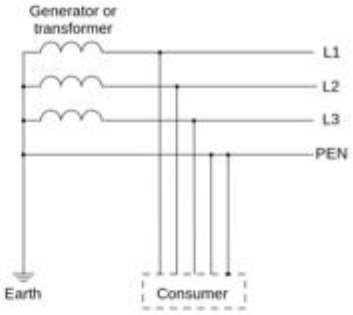
D. D

(PE: protective earth, N: neutral)

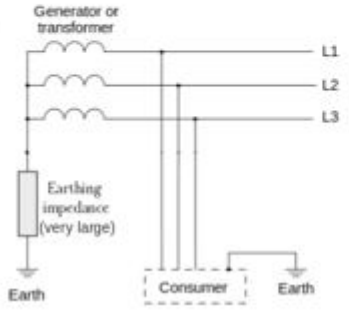
A.



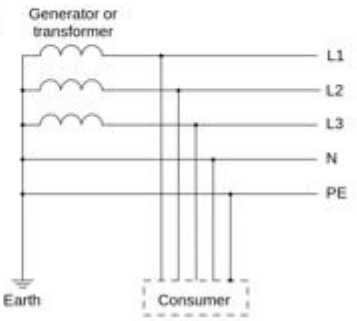
B.



C.



D.



Options :

9/16/2020

8995144001. 1
8995144002. 2
8995144003. 3
8995144004. 4

Question Number : 67 Question Id : 8995141007 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

An input signal is passed through an ideal low pass filter with cut-off frequency 500 Hz. The filtered signal is then sampled using an analog-to-digital converter (ADC). The minimum sampling frequency of the ADC should be

A. 500 Hz

B. 1 kHz

C. 250 Hz

D. 5 kHz

Options :
8995144005. 1
8995144006. 2
8995144007. 3
8995144008. 4

Question Number : 68 Question Id : 8995141008 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

A three-phase delta connected capacitor bank is connected in parallel to a lagging power factor load to make the overall power factor unity. If the same capacitors are now connected in star, the overall power factor will be

A. Lagging

B. Leading

C. Unity

D. Depends on the value of the capacitance C.

Options :
8995144009. 1
8995144010. 2
8995144011. 3
8995144012. 4

Question Number : 69 Question Id : 8995141009 Question Type : MCQ Option Shuffling : No Display Ques
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

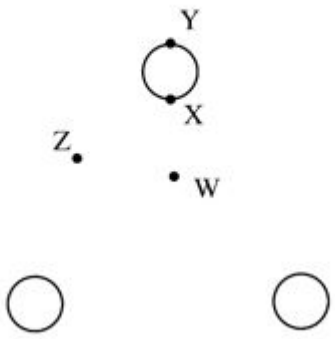
Consider a bundled conductor of an overhead line consisting of three identical sub-conductors placed at the corners of an equilateral triangle as shown in the figure. If we neglect the charges on the other phase conductors and ground, and assume that spacing between sub-conductors is much larger than their radius, the maximum electric field intensity is experienced at

A. Point W

B. Point X

C. Point Y

D. Point Z



Options :

8995144013. 1

8995144014. 2

8995144015. 3

8995144016. 4

Question Number : 70 Question Id : 8995141010 Question Type : MCQ Option Shuffling : No Display Que
Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

9/16/2020

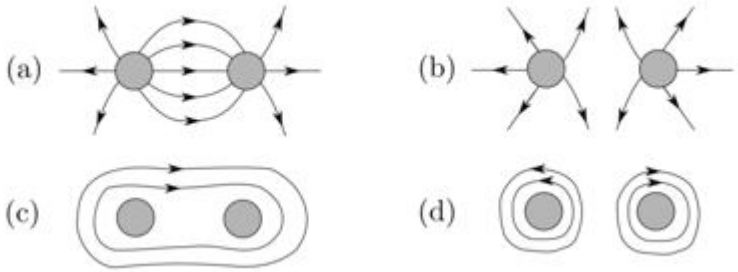
Which of the following figures represents the electrical field around a two-conductor bundle of one of the poles of a bipolar HVDC line?

A. (a)

B. (b)

C. (c)

D. (d)



Options :

8995144017. 1

8995144018. 2

8995144019. 3

8995144020. 4