2009
EE : Electrical Engineering

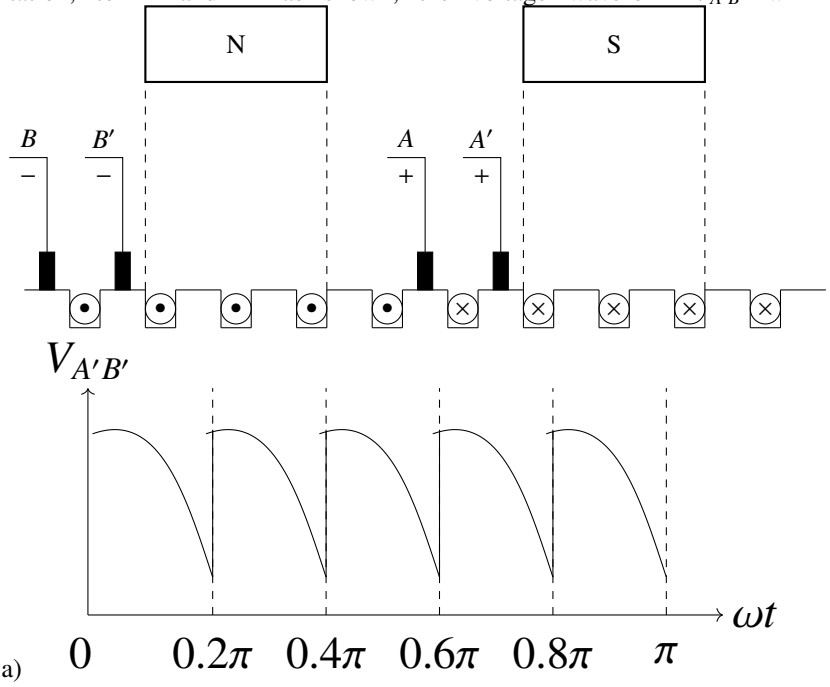
AI24BTECH11022 - Pabbuleti Venkata Charan Teja

49) An average-reading digital multimeter reads $10V$ when fed with a triangular wave, symmetric about the time-axis. For the same input an rms-reading meter will read

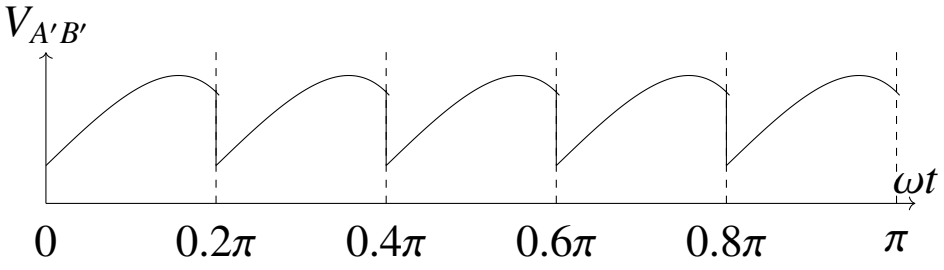
a) $\frac{20}{\sqrt{3}}$
b) $\frac{10}{\sqrt{3}}$
c) $20\sqrt{3}$
d) $10\sqrt{3}$

50) Figure shows the extended view of a 2 pole dc machine with 10 armature conductors. Normal brush positions are shown by A and B, placed at the interpolar axis. If the brushes are now shifted, in the direction of rotation, to A' and B' as shown, the voltage waveform $V_{A'B'}$ will resemble

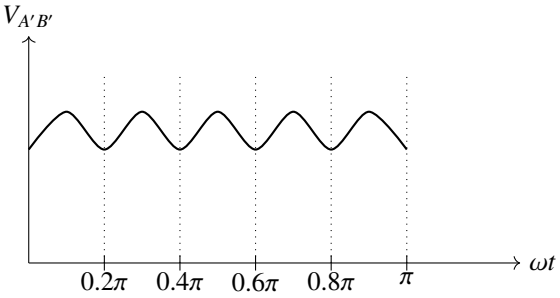
a)



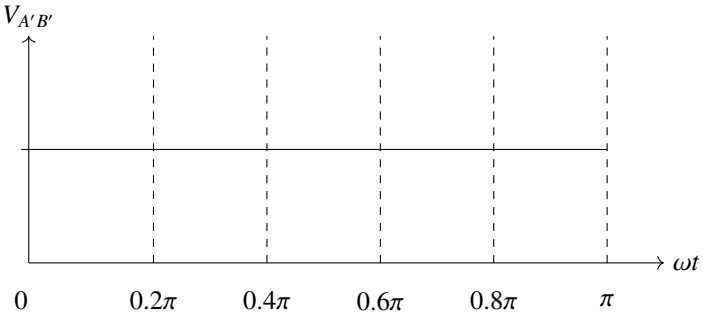
b)



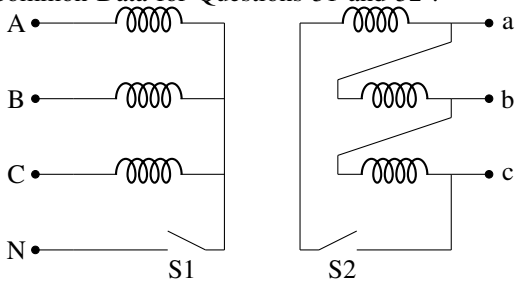
c)



d)



Common Data for Questions 51 and 52 :



The star-delta transformer shown above is excited on the star side with a balanced, $4-$ *wire*, $3-$ *phase*, sinusoidal voltage supply of rated magnitude. The transformer is under no load condition.

51) With both $S1$ and $S2$ open, the core flux waveform will be

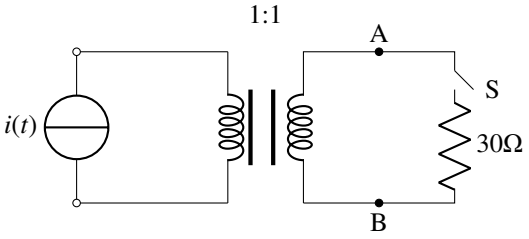
a) a sinusoid at fundamental frequency
b) flat-topped with third harmonic
c) peaky with third-harmonic
d) none of these

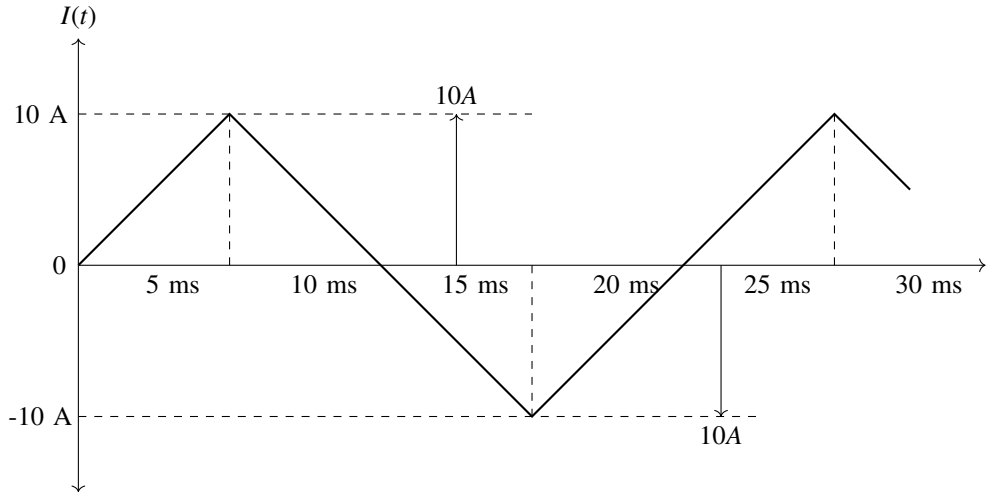
52) With $S2$ closed and $S1$ open, the current waveform in the delta winding will be

a) a sinusoid at fundamental frequency
b) flat-topped with third harmonic
c) only third-harmonic
d) none of these

Common Data for Questions 53 and 54 :

The circuit diagram shows a two-winding, lossless transformer with no leakage flux, excited from a current source, $i(t)$, whose waveform is also shown. The transformer has a magnetizing inductance of $\frac{400}{\pi} mH$.





53) The peak voltage across A and B, with S open is

a) $\frac{400}{\pi} V$
b) $800V$
c) $\frac{4000}{\pi} V$
d) $\frac{800}{\pi} V$

54) If the waveform of $i(t)$ is changed to $i(t) = 10 \sin 100\pi t A$, the peak voltage across A and B with S closed is

a) $400V$
b) $240V$
c) $320V$
d) $160V$

Common Data for Questions 55 and 56:

A system is described by the following state and output equations

$$\frac{dx_1(t)}{dt} = -3x_1(t) + x_2(t) + 2u(t)$$

$$\frac{dx_2(t)}{dt} = -2x_2(t) + u(t)$$

$$y(t) = x_1(t)$$

where $u(t)$ is the input and $y(t)$ is the output

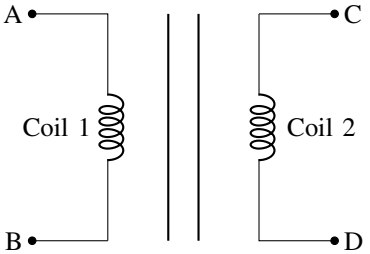
55) The system transfer function is

a) $\frac{s+2}{s^2+5s-6}$
b) $\frac{s+3}{s^2+5s+6}$
c) $\frac{2s+5}{s^2+5s+6}$
d) $\frac{2s-5}{s^2+5s-6}$

56) The state-transition matrix of the above system is

a) $\begin{bmatrix} e^{-3t} & 0 \\ e^{-2t}+e^{-3t} & e^{-2t} \end{bmatrix}$
b) $\begin{bmatrix} e^{-3t} & e^{-2t}-e^{-3t} \\ 0 & e^{-2t} \end{bmatrix}$
c) $\begin{bmatrix} e^{-3t} & e^{-2t}+e^{-3t} \\ 0 & e^{-2t} \end{bmatrix}$
d) $\begin{bmatrix} e^{3t} & e^{-2t}-e^{-3t} \\ 0 & e^{-2t} \end{bmatrix}$

Statement for Linked Answer Questions 57 and 58 :



The figure above shows coils 1 and 2, with dot markings as shown, having 4000 and 6000 turns respectively. Both the coils have a rated current of $25A$. Coil 1 is excited with single phase, $400V$, $50Hz$ supply.

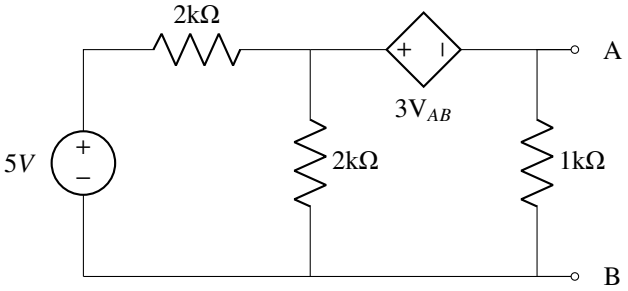
57) The coils are to be connected to obtain a single phase, $400/1000V$, auto-transformer to drive a load of $10kVA$. Which of the options given should be exercised to realize the required auto-transformer?

a) Connect A and D; Common B
b) Connect B and D; Common C
c) Connect A and C; Common B
d) Connect A and C; Common D

58) In the autotransformer obtained in Question 57, the current in each coil is

a) Coil-1 is 25A and Coil-2 is 10A
b) Coil-1 is 10A and Coil-2 is 25A
c) Coil-1 is 10A and Coil-2 is 15A
d) Coil-1 is 15A and Coil-2 is 10A

Statement for Linked Answer Questions 59 and 60 :



59) For the circuit given above, the Thevenin's resistance across the terminals A and B is

a) 0.5$k\Omega$
b) 0.2$k\Omega$
c) 1$k\Omega$
d) 0.11$k\Omega$

60) For the circuit given above, the Thevenin's voltage across the terminals A and B is

a) 1.25 V
b) 0.25 V
c) 1 V
d) 0.5 V