Sample Questions: Electrical Engineering

Directions : For each question in this section, read the five choices marked (A), (B), (C), (D) and (E) in your test book. Select the letter of the choice, which you consider is the correct answer. Then fill in the corresponding circle on your answer sheet.

1 An RC circuit is supposed to acquire steady state after closing a switch in the circuit in
(A) One time constant of the circuit

(B) Two time constant of the circuit

(C) Ten time constant of the circuit

(D) Will depend on the location of the switch

(E) None of the above

2 A series RLC circuit is connected to a sinusoidal voltage source operating at a frequency of 50 Hz. The current produced in the circuit in steady state will be
(A) A sinusoid of same frequency and phase but different amplitude than the applied sinusoid

(B) A sinusoid of different frequency but same phase and amplitude compared to the applied sinusoid

(C) A sinusoid of same frequency but different phase and amplitude compared to the applied sinusoid

(D) A ramp function of same frequency but different amplitude and phase

(E) None of the above

3   The instantaneous power, $p(t)$, consumed by a system varies with time. Consider a 1-ϕ system that takes a maximum of 1,866 W and minimum of -134 W power sinusoidally from a voltage source $v(t) = 311\cos(100\pi t)$. What is the Reactive Power (Q) delivered by the voltage source?

(A) 1,866 VARs   (B) 1,000 VARs   (C) 866 VARs

(D) 500 VARs   (E) None of the above

4   Consider a discrete-time periodic signal $x[n]$ with period 5, Fourier series coefficients a_k, and Fourier transform $X\left(e^{jw}\right)$. The average value of the time-domain signal is equal to

(A) a_1 (B) $\sum_{k=0}^{4} a_k$ (C) $X\left(e^{j\pi}\right)$

(D) a_{10} (E) none of the above

5   Let $x[n] = \left(\dfrac{1}{2}\right)^n u[n]$. Then $\displaystyle\int_{-\pi}^{+\pi} X\left(e^{jw}\right) dw$ equals

Hint: *You do not need to actually integrate $X\left(e^{jw}\right)$. There exists a shortcut!*

(A) 2   (B) 1   (C) 2π

(D) 0.5   (E) none of the above

6   Refer to the figure; the circuit is a
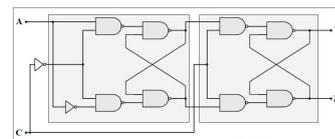
(A) SR Flip Flop   (B) D Flip Flop   (C) JK Flip Flop

(D) T Flip Flop   (E) None of the given

7   For 12-Bit binary numbers, the decimal equivalent range for Signed Numbers is

(A) 0 to 4095   (B) 0 to 4096   (C) -2048 to 2047

(D) -4096 to 4095   (E) -4096 to 4096

8 At a constant temperature, the intrinsic carrier concentration in a semiconductor
   has the following relationship with its band gap:

   (A) increases linearly with increasing bandgap

   (B) Decreases linearly with increasing bandgap

   (C) increases exponentially with increasing bandgap

   (D) Decreases exponentially with increasing bandgap

   (E) None of the above

9 The given circuit has an ideal OP–AMP having open
   loop gain equal to infinity. The closed loop gain of this
   circuit is:
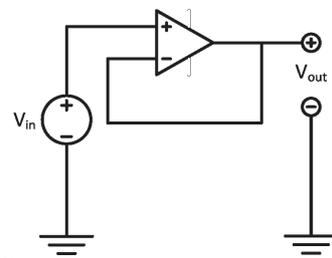
   (A) 0   (B) ∞ (C) 1

   (D) -1 (E) None of above

10 Total Internal Reflection is possible if
   (A) A wave travels from air to water   (B) A wave travels from air to glass

   (C) A wave travels from air to metal   (D) A wave travels from glass to air

   (E) None of the above

11 Consider the following circuit with $i(0-) = 0$. For $t \geq 0$,
   $i(t)$ will have the following general form:
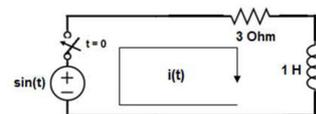
   (A) $Ae^{-3t}\cos(3t + \phi) + B\sin(t + \theta)$ (B) $Ae^{-t}\cos(t + \phi) + B\sin(3t + \theta)$

   (C) $A\cos(t + \phi) + Be^{-t}$ (D) $A\cos(t + \phi) + Be^{-3t}$

   (E) $A\cos(3t + \phi) + Be^{-3t}$

12 Consider an LTI system with transfer function $H(s) = \dfrac{s+4}{(s+2)(s+1)}$. For a unit-step input, the output in the steady-state settles at

(A) 1   (B) 2   (C) 4

(D) −4   (E) None of the above.

13 Consider a system with output $y(t)$ related to the input $x(t)$ through the differential equation

$$3\dot{y}(t) + y(t) = x(t - 0.5).$$

Which of the following is true?

(A) The system is non-linear

(B) The system is unstable

(C) The transfer function of the system is $H(s) = \dfrac{e^{-0.5s}}{3s + 1}$

(D) The transfer function of the system is $H(s) = \dfrac{1}{3s + 1}$

(E) The transfer function of the system is $H(s) = \dfrac{1}{3s - 1}$

14 The bandwidth of a frequency modulated signal is in general

(A) much smaller than amplitude modulated signal

(B) can at best be equal to amplitude modulated signal

(C) always equal to amplitude modulated signal

(D) zero

(E) None of the above

15 We connect a 1 ohm resistor in series with a 1 Henry inductor which is connected in series with a 1 Farad capacitor. What is the equivalent impedence $Z(s)$:

(A) 3   (B) $\dfrac{s^2 + s + 1}{s}$ (C) $\dfrac{s^3 + s^2 + s + 1}{s^2 + 1}$

(D) $s^2 + s + 1$ (E) $s^3 + s^2 + s + 1$

THESE QUESTIONS ARE JUST FOR SAMPLE. ANYTHING RELATED TO THE
SUBJECT CAN BE ASKED IN THE TEST.