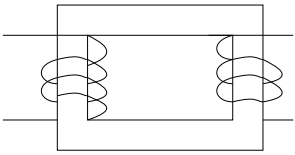
2009-EE-13-24

AI24BTECH11002 - K. Akshay Teja

1) The complete set of only those Logic Gates designated as Universal Gates is

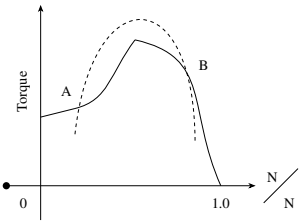
a) NOT, OR and AND Gates
b) XNOR, NOR and NAND Gates
c) NOR and NAND Gates
d) XOR, NOR and NAND Gates

2) The single phase, 50 Hz , iron core transformer in the circuit has both the vertical arms of cross sectional area 20 cm^2 and both the horizontal arms of cross sectional area 10 cm^2. If the two windings shown were wound instead on opposite horizontal arms, the mutual inductance will



a) double
b) remain same
c) be halved
d) become one quarter

3) A 3-phase squirrel cage induction motor supplied from a balanced 3-phase source drives a mechanical load. The torque-speed characteristics of the motor (solid curve) and of the load (dotted curve) are shown. Of the two equilibrium points A and B, which of the following options correctly describes the stability of A and B?

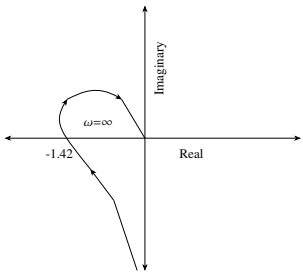


a) A is stable, B is unstable
b) A is unstable, B is stable
c) Both are stable
d) Both are unstable

4) An SCR is considered to be a semi-controlled device because

a) it can be turned OFF but not ON with a gate pulse
b) it conducts only during one half-cycle of an alternating current wave
c) it can be turned ON but not OFF with a gate pulse
d) it can be turned ON only during one half-cycle of an alternating voltage wave

5) The polar plot of an open loop stable system is shown below. The closed loop system is



a) always stable
b) marginally stable
c) unstable with one pole on the RH s-plane
d) unstable with two poles on the RH s-plane

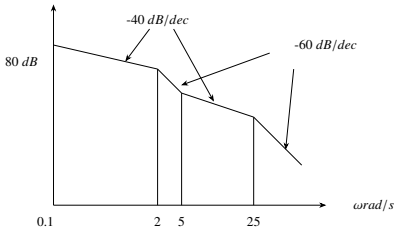
6) The first two rows of Routh's tabulation of a third order equation are as follows.

s^3	2	2
s^2	4	4

This means there are

a) two roots at $s = \pm j$ and one root in right half s-plane
b) two roots at $s = \pm j2$ and one root in left half s-plane
c) two roots at $s = \pm j2$ and one root in right half s-plane
d) two roots at $s = \pm j$ and one root in left half s-plane

7) The asymptotic approximation of the log-magnitude *vs* frequency plot of a system containing only real poles and zeros is shown. Its transfer function is

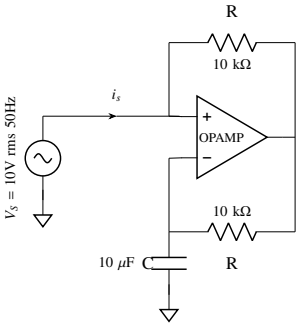


a) $\frac{10(s+5)}{s(s+2)(s+25)}$ b) $\frac{1000(s+5)}{s^2(s+2)(s+25)}$ c) $\frac{100(s+5)}{s(s+2)(s+25)}$ d) $\frac{80(s+5)}{s^2(s+2)(s+25)}$

8) The trace and determinant of a 2×2 matrix are known to be -2 and -35 respectively. Its eigenvalues are

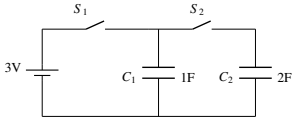
a) -30 and -5 b) -37 and -1 c) -7 and 5 d) 17.5 and -2

9) The following circuit has $R = 10k\Omega, C = 10\mu F$ The input voltage is a sinusoid at 50 Hz with an rms value of 10 V . Under ideal conditions, the current i_S from the source is



a) $10\pi mA$ leading by 90°
b) $20\pi mA$ leading by 90°
c) $10mA$ leading by 90°
d) $10\pi mA$ lagging by 90°

10) In the figure shown, all elements used are ideal. For time $t < 0$, S_1 remained closed and S_2 open. At $t = 0$, S_1 is opened and S_2 is closed. If the voltage V_{c2} across the capacitor C_2 at $t = 0$ is zero, the voltage across the capacitor combination at $t = 0^+$ will be

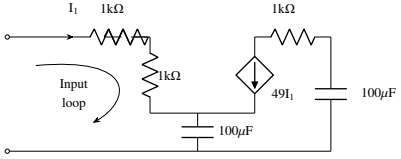


a) 1 V
b) 2 V
c) 1.5 V
d) 3 V

11) Transformer and emitter follower can both be used for impedance matching at the output of an audio amplifier. The basic relationship between the input power P_{in} and output power P_{out} in both cases is

a) $P_{in} = P_{out}$ for both transformer and emitter follower
b) $P_{in} > P_{out}$ for both transformer and emitter follower
c) $P_{in} < P_{out}$ for transformer and $P_{in} = P_{out}$ for emitter follower
d) $P_{in} = P_{out}$ for transformer and $P_{in} < P_{out}$ for emitter follower

12) The equivalent capacitance of the input loop of the circuit shown is



a) 2 μF
b) 100 μF
c) 200 μF
d) 4 μF