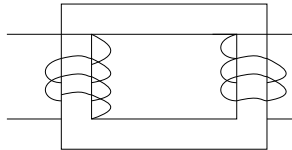


1) The complete set of only those Logic Gates designated as Universal Gates is

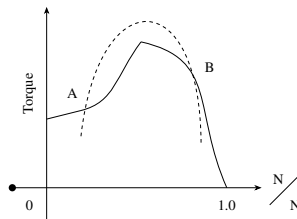
- a) NOT, OR and AND Gates
- b) XNOR, NOR and NAND Gates
- c) NOR and NAND Gates
- d) XOR, NOR and NAND Gates

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?

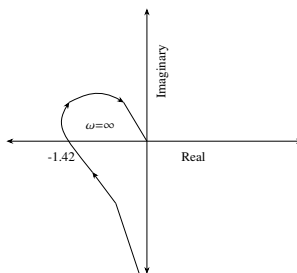


- a) A is stable, B is unstable
- b) A is unstable, B is stable
- c) Both are stable
- d) Both are unstable

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

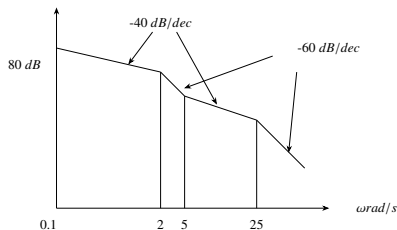


- a) always stable
b) marginally stable
c) unstable with one pole on the RH s-plane
d) unstable with two poles on the RH s-plane
- 6) The first two rows of Routh's tabulation of a third order equation are as follows.

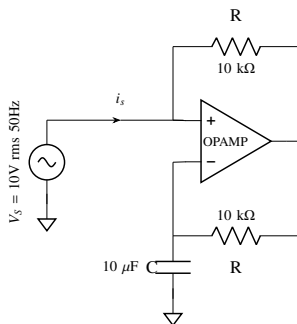
$$\begin{array}{cc} s^3 & 2 & 2 \\ s^2 & 4 & 4 \end{array}$$

This means there are

- a) two roots at $s = \pm j$ and one root in right half s-plane
b) two roots at $s = \pm j/2$ and one root in left half s-plane
c) two roots at $s = \pm j/2$ 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

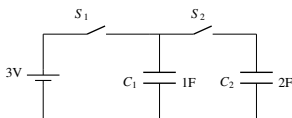


- a) $\frac{10(s+5)}{s(s+2)(s+25)}$
b) $\frac{1000(s+5)}{s^2(s+2)(s+25)}$
c) $\frac{100(s+5)}{s(s+2)(s+25)}$
d) $\frac{80(s+5)}{s^2(s+2)(s+25)}$
- 8) The trace and determinant of a 2×2 matrix are known to be -2 and -35 respectively. Its eigenvalues are
- a) -30 and -5
b) -37 and -1
c) -7 and 5
d) 17.5 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° c) $10mA$ leading by 90°
 b) $20\pi mA$ 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

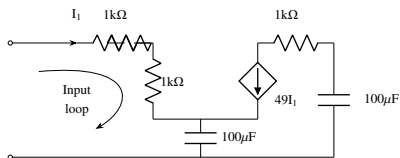


- a) 1 V b) 2 V c) 1.5 V d) 3 V

- 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) $2 \mu F$ b) $100 \mu F$ c) $200 \mu F$ d) $4 \mu F$