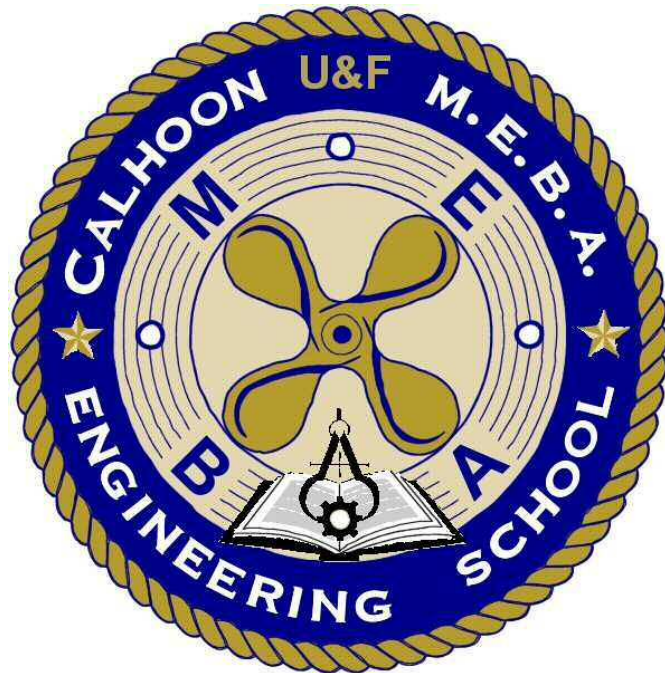


Calhoun MEBA Engineering School

**Study Guide
for Proficiency
Testing
Industrial Electronics**



Industrial Electronics Study Guide
January 2016

1. Which factors affect the end-to-end resistance of a metallic conductor?
2. A waveform shows three complete cycles on an oscilloscope trace in a time of 1.77 microseconds. The frequency of this signal is what?
3. A changing current in one electric circuit induces voltage into another electric circuit. This is the definition of what?
4. Good insulators generally have what characteristics?

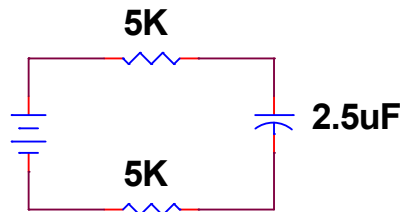


figure 04

5. For the circuit shown in figure 4, what is the time constant?
6. The energy stored by a 25 μF capacitor charged to 9500 Vdc is what (in joules)?
7. The corrosion of an isolated metal object in an electrolyte describes which type of corrosion?
8. A bipolar junction transistor (BJT) can be likened to what type of device or electronic effect?
10. A thyristor is a semiconductor with what characteristics and applications?
11. The two BJT parameters, "beta" and "hfe", represent what type of gain?
13. A triac acts in most cases as though it were two SCR's in what configuration?
14. A junction FET is available as what form?

Industrial Electronics Study Guide
January 2016

15. How are the three terminals of a triac labeled?
16. Vcc for a NPN transistor has what attribute?
17. The diode most often used for voltage regulation and voltage reference applications is what type?

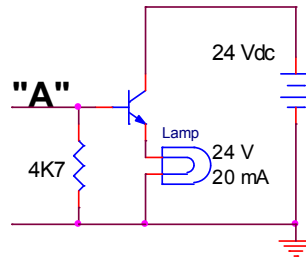


figure 1

18. For the circuit shown in figure 1, if the input lead "A" is short circuited to ground, what will be the result.

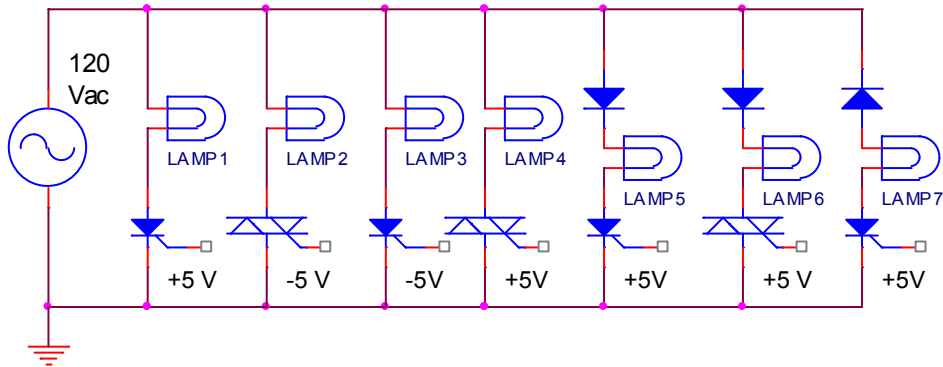


figure 3

19. The lamp circuits in figure 3 are supplied by 120 Vac. With gating voltages as indicated, what are the extinguished lamps?

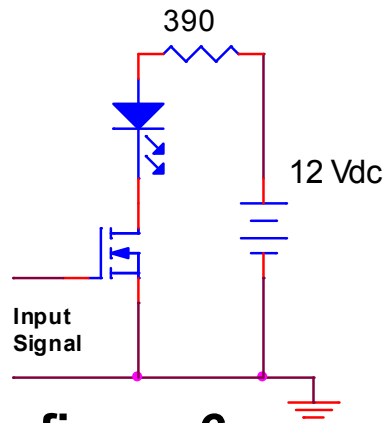


figure 6

20. To light the LED shown in figure 6, what is the required polarity of the gate voltage with respect to the source terminal?

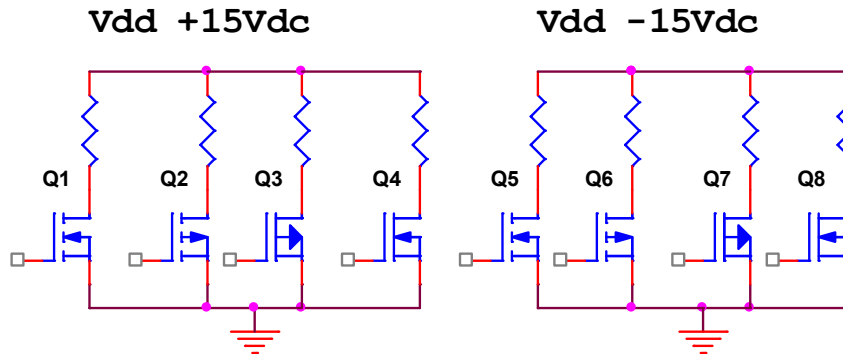


figure 7

21. In figure 7, what are the MOSFET's that are N-channel enhancement-mode devices?
22. Output impedance of an operational amplifier, in general, has what characteristic?
23. An op-amp always affects the output signal in what way?
25. A differential amplifier has what effect on the two input signals?
26. In an integrator, the feedback element is what type of device?
27. The voltage gain of a 4-input summing amplifier is 1. If the feedback resistor is $4\text{k}\Omega$, the input resistors must each equal what value?
28. For a non-inverting amplifier, voltage gain is mathematically represented as what relationship?
29. What is the expected voltage drop across a 4-20 mA transmitter that is sourced by a 24 volt power supply, if its output is 12 mA and the circuit contains a single 250 ohm load?

Industrial Electronics Study Guide
January 2016

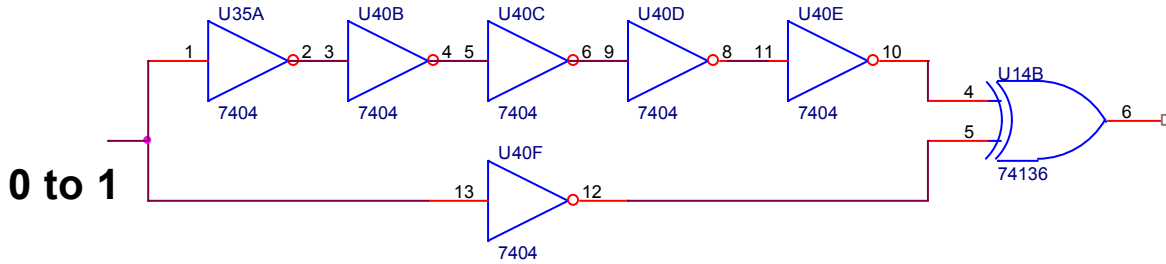


Figure 06

30. In the circuit shown in figure 06, the propagation delay of each gate is 10 nsec. What is the width of the output pulse when the input transitions from "0" to "1".

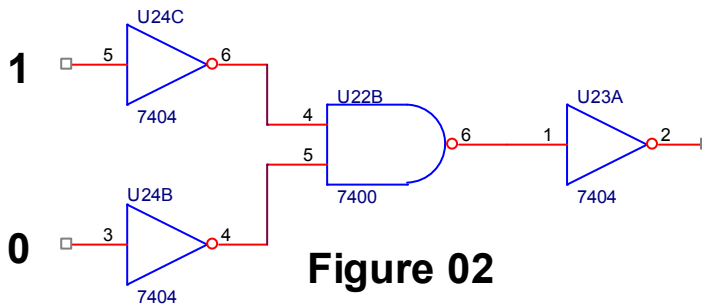


Figure 02

31. In figure 2 with the inputs as shown, the output logic is what?
32. A single flip-flop has the capability to store what quantity of information?
33. What is the resolution of a 12 bit ADC with a 0-10 volt input signal range?
34. The RMS value of a square wave with a peak-to-peak value of 14 volts is what voltage?
35. In PLC programming, the normally closed contact symbol (Examine Off) is logically what type of gate?
36. What is the result of bitwise "and'ing" 10101101 and 11111001?
37. What is the main advantage of RS-485 over RS-23
38. What cable grounding configurations offer the best solution to mitigate both, low and high frequency interference as well as inhibiting ground loop currents?

Industrial Electronics Study Guide
January 2016

39. How is the output voltage of a PWM drive varied?
40. A repetitive pulse is on for 4.5 msec and is off for 8.9 msec. is what the duty cycle?
41. An RC snubber placed in shunt with an SCR is designed to limit what?
42. Power is supplied to the inverter section of a VFD as what type of current and voltage?
43. Harmonic currents and voltages in a power system may cause what types of problems?
44. What are the main properties of a Pt-100 RTD?
45. If the incoming (line side) voltage to a PWM drive is 480 volts, the expected DC bus voltage can be calculated to what value?
46. A surge suppression diode is used with DC loads having significant inductive reactance. With respect to the load and its normal operating polarity, where is the diode is placed in the circuit?
47. Inherent line commutation of SCR's is possible under what conditions?
48. What is the binary equivalent of the hex number f0ff?
49. The RMS value of a sine wave with a peak-to-peak value of 300 volts is calculated as what value?
50. How many diodes are required for an uncontrolled three-phase full-wave bridge rectifier?
51. A 60 Hz, three-phase, full wave, bridge rectifier has a ripple frequency of _____ Hz?

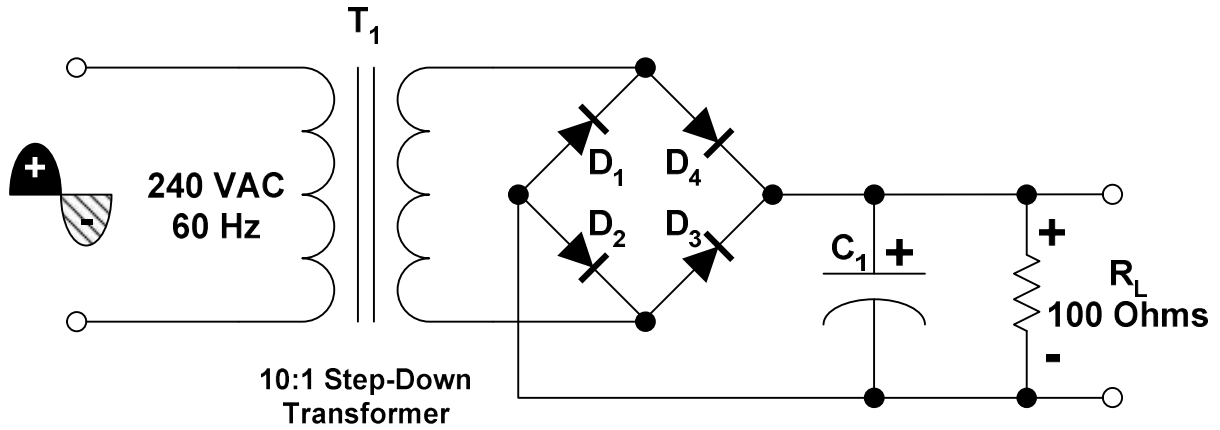


Figure 10

52. For the circuit of Figure 10, the output voltage across R_L with the input signal as indicated is what?
53. The two most important ratings for a power rectifier diode are what?

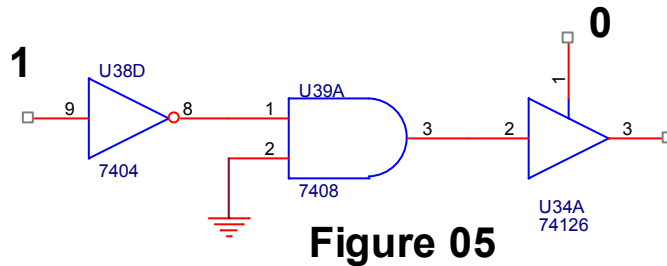


Figure 05

54. In figure 05 with the inputs as shown, the expected output is what?
55. A short time delay is needed in the lube oil pressure shut-down circuit of the SSDG while it is being started. The PLC has a digital timer which has to be loaded with the correct Hex value to set the required time delay. What Hex value needs to be loaded if the desired time delay is 8.5 seconds and each increment is 0.002 seconds?

Industrial Electronics Study Guide
January 2016

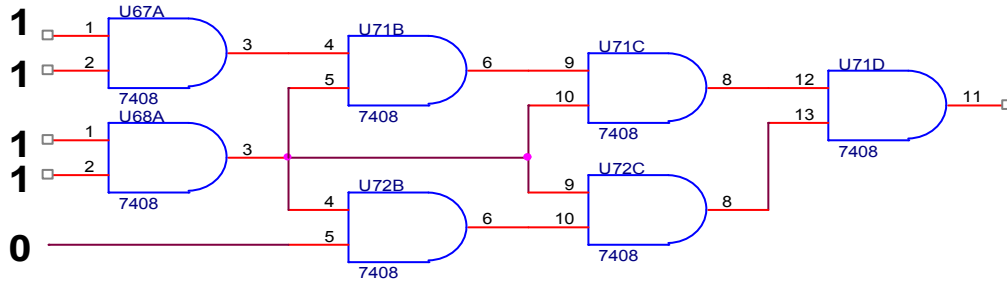


Figure 11

56. In Figure 11, with the inputs as shown, what is the expected output?

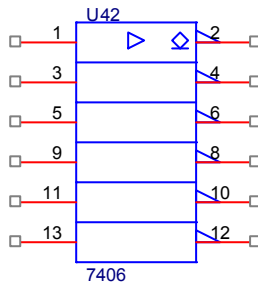
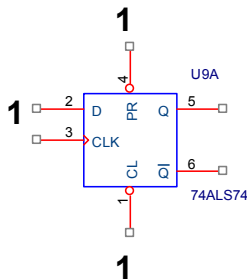


Figure 13

57. The logic symbol shown in Figure 13 can best be described as what functional device?



59. For the logic device shown in the figure above, what will be the state of the output after one clock cycle?

60. What is the purpose of the zener diode in an I.S. Zener barrier?

61. What is the most common failure mode for a high-power SCR?

62. What is needed for an SCR to return to its blocking state?
63. The standard full-scale values for the secondary windings of CT's and VT's are typically what current and voltage?
64. What factor will decrease the inductance of a solenoid coil?

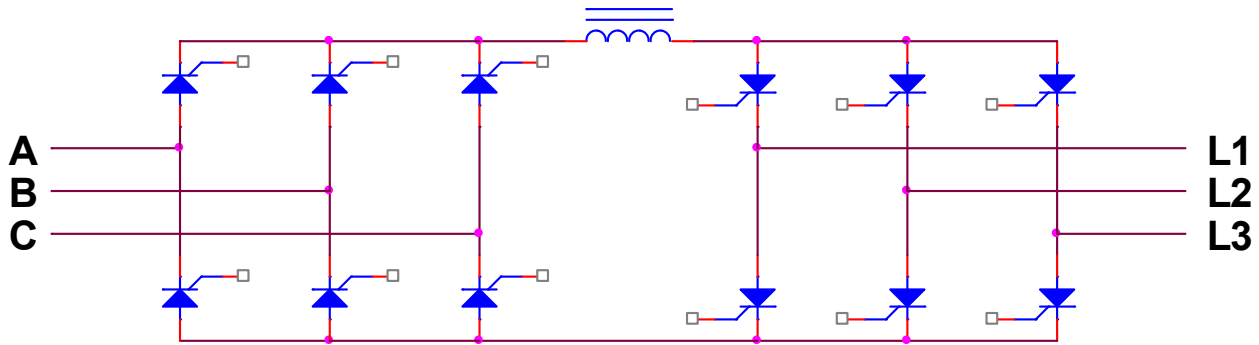


figure 11

65. The circuit shown in figure 11 is an elementary schematic diagram for what type of device?
66. Conductance is the reciprocal of resistance. What are the units?
67. Give two reasons why current loops are preferred over voltage for industrial analog signal transmission.
68. What are some techniques for minimizing electrical interference on signal lines?
69. The characteristic of any system which results in there being a different output for the same input - depending upon whether the input is approached from a higher or lower value has a term. What is it?
70. At the instant a voltage is applied to an uncharged capacitor, the capacitor appears to act (electrically) as what?
a.
71. What are the energy losses in a choke (reactor)?
72. Bipolar Junction Transistors (BJT's) are available in two varieties. What are they?

Industrial Electronics Study Guide
January 2016

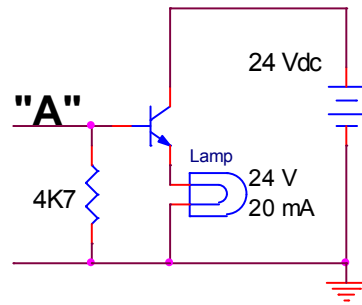


figure 2

73. For the circuit shown in figure 2, if the input lead "A" is connected to +24 Vdc, what is the resulting effect?
74. Line to line voltage is measured as 12,470 Vac. The expected phase voltage is what?