

**COMPETITOR'S INSTRUCTION:-**

**Attempt all questions: Where applicable circle the letter that indicates the correct answer.  
Otherwise answer questions as instructed**

**C - ANALOGUE FUNDAMENTALS**

C1.0 The formula for electrical current is:

- a) Voltage / Resistance.
- b) Resistance \* Voltage.
- c) Voltage + Resistance.
- d) Resistance / Voltage.

(0.5)

C1.1 Electric current is the flow of which of the following?

- a) Neutrons
- b) Photons
- c) Electrons
- d) Quarks

(0.5)

C1.2 Which of the following is a unit of electrical resistance?

- a) Volt
- b) Amp
- c) Ohm
- d) Coulomb

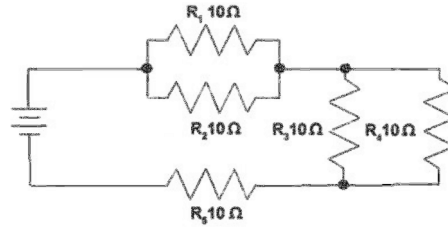
(0.5)

C1.3 In a DC circuit with a constant voltage, if the circuit resistance increases the circuit current will:

- a) decrease.
- b) stop.
- c) increase.
- d) remain constant.

(0.5)

C1.4 Calculate the total circuit resistance (R1 – R5).



Calculations:

(0.5)

C1.5 Zener diodes are most commonly used in:

- c) voltage amplifier circuits.
- b) oscillator circuits.
- c) power supply circuits.
- d) current limiting circuits.

(0.5)

C1.6 Express 1/5 as a decimal number.

- c) 0.15
- b) 0.2
- c) 0.25
- d) 0.5

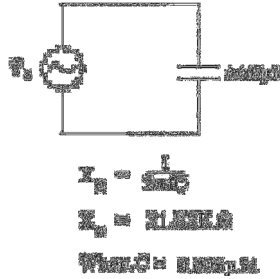
(0.5)

C1.7 A step-up transformer increases

- a) voltage.
- b) current.
- c) power.
- d) frequency.

(0.5)

C1.8 If the frequency of the source ( $V_s$ ) is 1 kHz, what is the value of the capacitive reactance ( $X_C$ ) of the circuit if the capacitor value is changed to 0.01  $\mu\text{fd}$ ?



- a)  $X_C = 63.6 \text{ k}$ , b)  $X_C = 31.8 \text{ k}$ , c)  $X_C = 15.9 \text{ k}$ , d)  $X_C = 5.0 \text{ k}$  (1)

Calculation:

C1.9 What is the approximate peak-to-peak voltage of a 2 V<sub>RMS</sub> sine wave?

- a) 2.0 V<sub>p-p</sub>      b) 2.8 V<sub>p-p</sub>      c) 4.0 V<sub>p-p</sub>      d) 5.6 V<sub>p-p</sub> (1)

Calculation:

C1.10 What are the characteristics of a coaxial cable?

- It has twisted pairs with a shield.
- It has a centre conductor covered with an insulator, then braided or solid outer conductor and then insulation.

- c) It has heavier insulation than most cables.  
d) It is vulnerable to high frequency interference. (0.5)

- C1.11 In an amplifier with negative feedback, the bandwidth is  
a) increased by a factor of  $\beta$   
b) decreased by a factor of  $\beta$   
c) increased by a factor of  $(1+A \beta)$   
d) not affected at all by the feedback

Where A = gain of the basic amplifier and  $\beta$  = feedback factor (0.5)

C1.12 The forward characteristic of a diode has a slope of approximately 50mA/V at a desired point. The approximate incremental resistance of the diode is

- a) 50 $\Omega$  b) 35 $\Omega$  c) 20 $\Omega$  d) 10 $\Omega$  (2)

C1.13 A bistable multivibrator is a:

- a) Free running oscillator.                      b) Triggered oscillator.  
c) Saw tooth wave generator.                  d) Crystal oscillator.

(1)

C1.14 Transistor is a:

- a) Current controlled current device.        b) Current controlled voltage device.  
c) Voltage controlled current device        d) Voltage controlled voltage device.

(1)

C1.15 A differential amplifier, amplifies:

- a) and mathematically differentiates the average of the voltages on the two input lines  
b) and differentiates the input waveform on one line when the other line is grounded  
c) the difference of voltages between the two input lines

d) and differentiates the sum of the two input waveforms

(1)

C1.16 Wien bridge oscillator can typically generate frequencies in the range of:

- a) 1KHz – 1MHz                      b) 1 MHz – 10MHz  
c) 10MHz – 100MHz                d) 100MHz – 150MHz

(1)

C1.17 The control terminal (pin5) of 555 timer IC is normally connected to ground through a capacitor (~ 0.01 $\mu$ F). This is to:

- a) protect the IC from inadvertent application of high voltage  
b) prevent false triggering by noise coupled onto the pin  
c) convert the trigger input to sharp pulse by differentiation  
d) suppress any negative triggering pulse

(1)

C1.18 The frequency of oscillation of a tuned-collector oscillator having  $L= 30\mu\text{H}$  and  $C = 300\text{pf}$  is nearly:

- a) 267 kHz                      b) 1677 kHz                      c) 1.68 kHz                      d) 2.67 MHz

(2)

Calculation:

C1.19 Removing bypass capacitor across the emitter-leg resistor in a Common Emitter amplifier causes

- a) increase in current gain.                      b) decrease in current gain.

- b) c) increase in voltage gain.                      d) decrease in voltage gain.

(1)

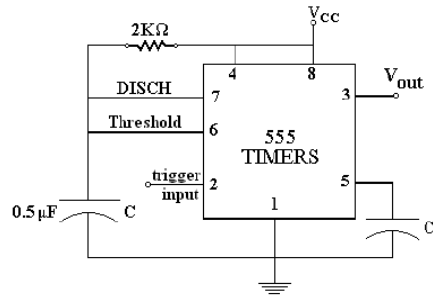
C1.20 A negative feedback of  $\beta = 2.5 \times 10^{-3}$  is applied to an amplifier of open loop gain 1000. Calculate the change in overall gain of the feedback amplifier if the gain of the internal amplifier is reduced by 20%.

(3)

Calculate:

**C - Digital Fundamentals**

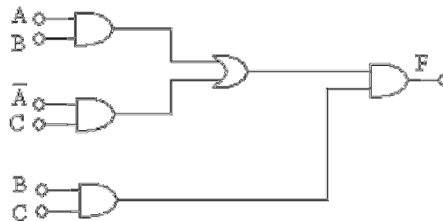
C2.0 Find the period of the output pulse in the circuit shown below:



(2)

Calculations:

C2.1 Prepare the truth table for the output 'F' of the logic circuit shown in figure below.  
 Write also the 'Sum of Product' (SOP) expression for 'F'.



(4)

Answer:

C2.2 What is the binary equivalent of the decimal number 368

- a) 101110000,      b) 110110000,      c) 111010000,      d) 111100000, (2)

Calculate:

The decimal equivalent of hex number 1A53 is

- a) 6793,      b) 6739,      c) 6973,      d) 6379, (2)

Calculate

C2.3 The number of control lines for a 8 – to – 1 multiplexer is

- a) 2,      b) 3,      c) 4,      d) 5, (1)

C2.4 The output of a logic gate is 1 when all its inputs are at logic 0. The gate is either

- a) a NAND or an EX-OR      b) an OR or an EX-NOR**  
**c) an AND or an EX-OR      d) a NOR or an EX-NOR** (1)

C2.5 The 2's complement of the number 1101101 is

- a) 0101110      b) 0111110c) 0110010      d) 0010011** (1)

Calculation:



C2.6 How many address bits are required to represent a 32 K memory

- a) 10 bits.                      b) 12 bits.                      c) 14 bits.                      d) 16 bits.                      (1)

Calculate:

C2.7 Determine the analogue output voltage of 6-bit DAC (R-2R ladder network) with  $V_{ref}$  as 5V when the digital input is 011100.

(3)

Calculate:

C2.8 An 8-bit successive approximation ADC has a resolution of 20mV. What will be its digital output for an analogue input of 2.17V?

(2)

Calculate:

C2.9

**Industrial Electronics    C - Electronic Fundamentals**  
**TP16                            (Analogue & Digital )**  
**(1.5hours)**



EPROM contents can be erased by exposing it to

- a) Ultraviolet rays.    b) Infrared rays.    c) Burst of microwaves.    d) Intense heat radiations.

(1)