

Test Answer Sheet

Surname:	Subject:
Name:	Date:
ID number:	Time:

Exam 2 Memo Hardware 321.

Q1

1. F	2. F	3. F	4. F	5. F
6. F	7. F	8. F	9. F	10. F

Invigilated by:

Q2:

@ Serial

Parallel

Marked by:

Date:

Moderated by:

- one bit @ a time

- multiple bits at a time

- less lines

- more lines

- less crosstalk

- susceptible to crosstalk

- less bulky interfaces

- bulky interfaces

- less electromagnetic interference (EMI)

- more susceptible to EMI

(b) Odd Parity: parity bit is transmitted as a 1 if the number of preceding marks is an odd number. For the binary value of 0110 011 the parity bit will be 1.

Even Parity - affords a small amt of error checking, parity bit is transmitted with a value of 0 if the number of preceding marks is an even number. For the binary value 0110 0110 the parity bit will be 0.

(c) Uses of Caps:

- storing energy
- timing circuits
- stabilising DC
- Blocking DC
- Coupling

Q3:

SERVO

- closed loop sys
- no power is used at standstill
- precise position control
- relatively costly
- no easy control from computer

STEPPER

- open loop system
- draws max current constantly
- not very precise
- cheaper
- easy to control from a computer
- develops slippage

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- no slippage

Do not write in this space, it is provided for marking

⑥ Indication

Illumination

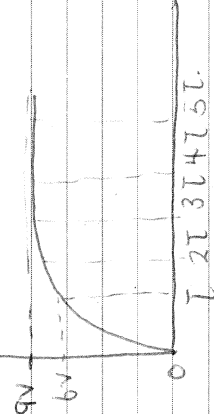
⑦ Microprocessors

Microcontrollers

- contains a CPU only
- Bulkier
- more power is consumed
- more versatile
- may not be programmed
- to handle real time tasks
- equivalent to a brain
- has a CPU, memory I/O pins, timers, counters
- Compact
- less power is consumed
- less versatile
- can handle real time tasks
- as they are self sufficient
- equivalent to the entire body.

Qn 4:

@ Current will pass through resistor R1 and charge capacitor C1. As the voltage across C1 increases, the current reduces. This means the rate of charging becomes progressively slower. After about 5 time constants C1 is fully charged to as close as possible to the supply voltage E_{av} . The relationship between voltage and time is shown below:



$$\textcircled{D} \quad T = RC$$

$$= 33 \times 10^3 \times 1 \times 10^{-6}$$

$$= 33 \times 10^{-3} \text{ s} \approx 33 \text{ ms}$$

⑦ Time constant is the time it takes for the charging current to fall to $\frac{1}{e}$ of the initial value ($\approx 37\%$)

or: the time it takes for the charging voltage to increase to 63% of the initial value.



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Q N 5:

Invalidated by:

@ $R_1 + R_2 + R_5$ are in series

$$R = 22 + 120 + 50 = 192 \Omega$$

$$R_3 + R_4 = 10 + 100 = 110 \Omega$$

Branches in parallel:

$$\frac{1}{R_T} = \frac{1}{110} + \frac{1}{192}$$

$$= 0,014299$$

$$R_T = 69,93 \Omega \approx 70 \Omega$$

⑥ V across R_2

using the voltage divider rule

$$\frac{120}{192} \times 12 = 7,5V$$

Across R_4

$$\frac{100}{110} \times 12 = 10,91V$$

Across R_5

$$\frac{50}{192} \times 12 = 3,125V$$

Resistors:

- ③ limiting current
- dividing voltage
- creation of resistor / capacitor networks

④ Inductors:

- smoothing voltage in a power supply
- frequency filters
- radio tuning circuits
- in transformers

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Qn 6:

Ⓐ Inverting Amplifier

$$\text{Gain} = -\frac{R_f}{R_{in}}$$

$$7.5 = \frac{R_f}{8.3 \times 10^3}$$

$$R_f = 62.25 \times 10^3 \\ = 62.25 \text{ K}\Omega$$

Ⓑ Inverting Summing Amplifier

$$\text{Ⓐ} \quad -\left(\frac{R_1}{R_2}\right)V_{in} + -\left(\frac{R_1}{R_3}\right)V_{in2} = V_{out}$$

$$-\left(\frac{10}{1} \times 2\right) + -\left(\frac{10}{2} \times 5\right)$$

$$-20 - 25 = -45 \text{ V}$$

Ⓒ Infinite open loop gain
Infinite input impedance

Zero output impedance

Zero offset voltage

Infinite Bandwidth

Zero Noise Contribution.