



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE  
NOVEMBER EXAMINATION  
DIGITAL ELECTRONIC N6**

**29 NOVEMBER 2016**

**This marking guideline consists of 12 pages.**

**QUESTION 1****1.1 USER-FRIENDLY BASIC PROGRAM TO PRINT ALL INTEGERS FROM 1 TO 99:****2010 PRINT "HELLO DEAR USER OF MY PROGRAM."****2020 PRINT "WHEN YOU RUN THIS PROGRAM"****2030 PRINT "YOU WILL SEE DISPLAYED ON YOUR"****2040 PRINT "SCREEN EACH"****2050 PRINT "INTEGER FROM 1 TO 99"****2060 PRINT "PLEASE ENJOY RUNNING MY PROGRAM!"****2070 LET INTEGER = 1****2080 PRINT INTEGER****2090 LET INTEGER = INTEGER + 1****2100 IF INTEGER > 99 THEN GOTO 2120****2110 GOTO 2080****2120 STOP****2130 END**

(10)

1.2

✓

✓

✓✓

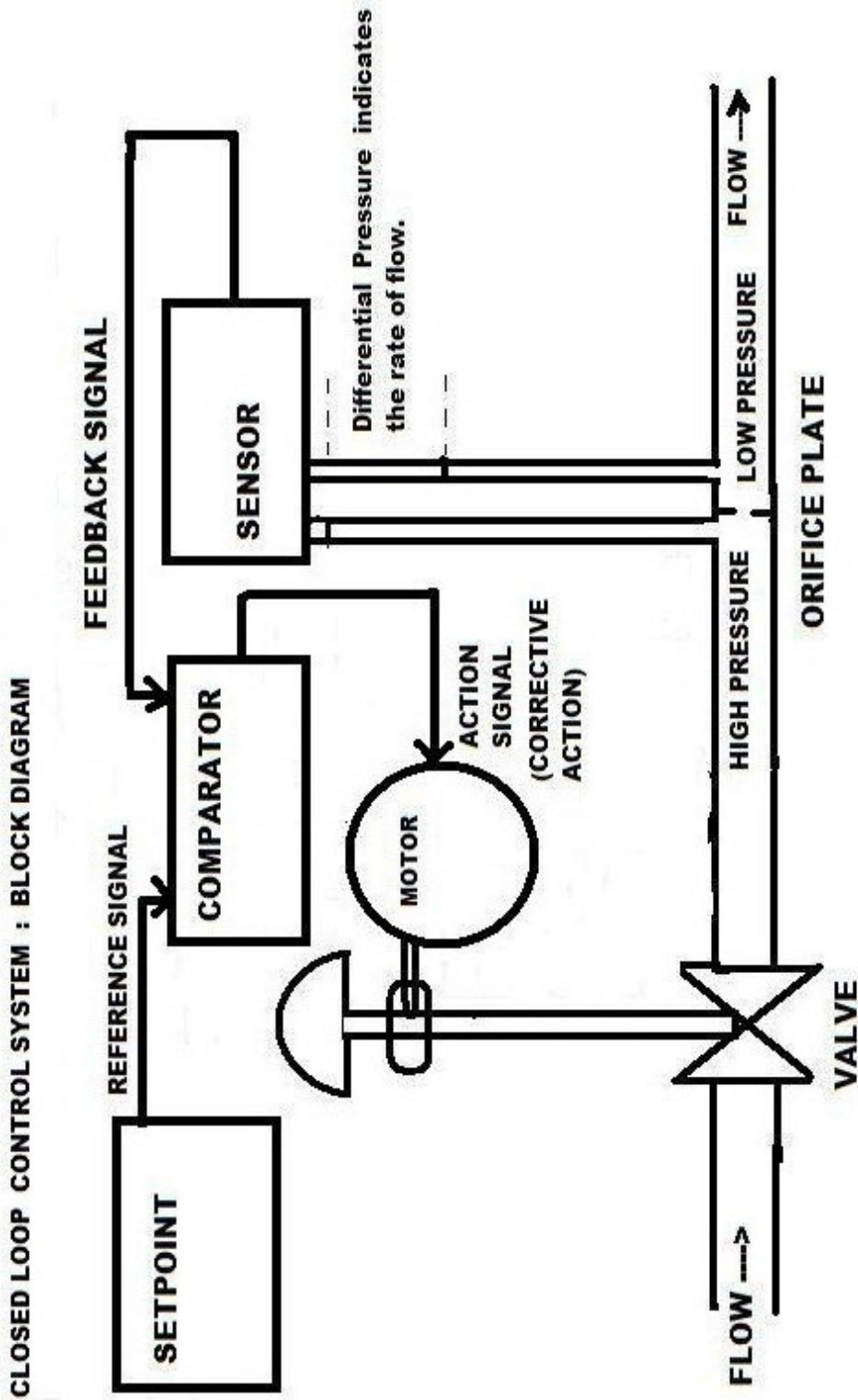
✓✓

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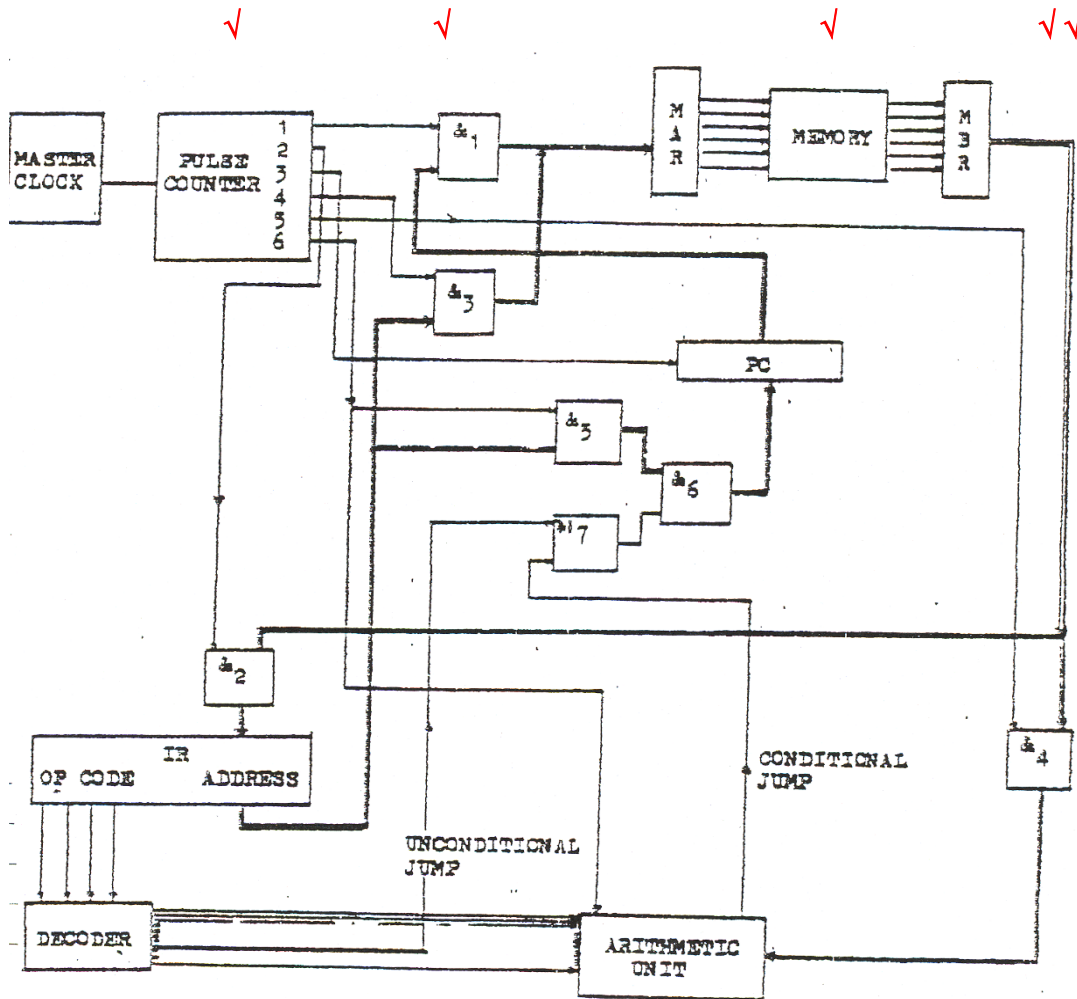
(10)  
[20]

**QUESTION 2**

2.1 THE FINAL PRINT-OUT FOR TODAY'S PROGRAM IS AS FOLLOWS:  
FULL MARKS FOR CORRECT PRINT-OUT!  
ALL THE BEST FOR YOUR EXAMINATIONS!  
DEPEND ON PROFESSIONAL WORK

(10)

2.2 CONTROL UNIT

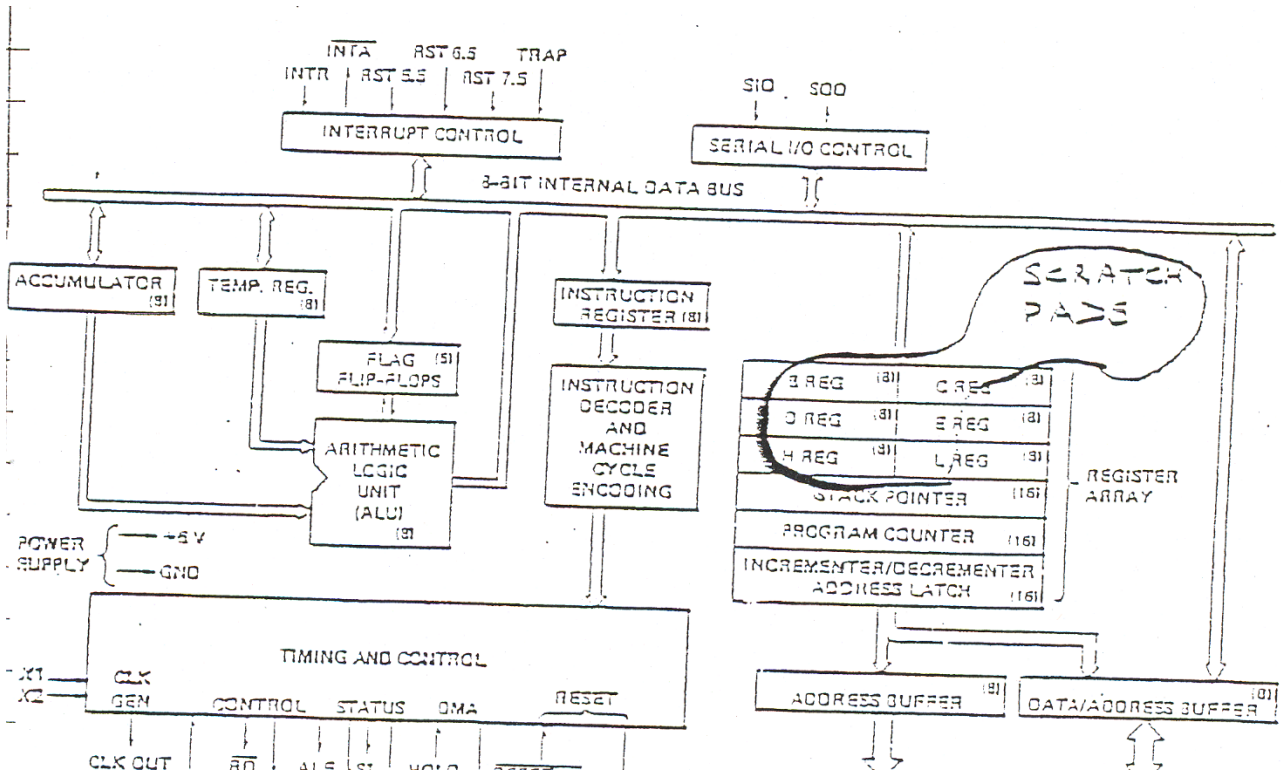


(10)  
[20]

**QUESTION 3**

3.1 **BLOCK DIAGRAM: MICROPROCESSOR: INTEL 8085A CPU**

**INTEL 8085A CPU: MANUFACTURER INTEL CORPORATION**



Manufacturer/Vervaardiger: INTEL CORP.

(10)

3.2 GRAPHICAL FORMAT : NRZ PCM

	✓	✓	✓	✓	✓	
	<u>PACKET</u>	<u>PACKET</u>	<u>PACKET</u>	<u>PACKET</u>	<u>PACKET</u>	
ASCII	0110001	0110010	0110011	0110100	0110101	ASCII
VALUES	7	7	7	7	7	VALUES
"1" →	-----					NRZ PCM UNIPOLAR BINARY FORMAT
"0" →	-----					
	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	

(5)

3.3 Machine code computation

$$\begin{array}{r}
 2\ 000 \\
 20\ + \\
 28\ + \\
 -\ 24 \\
 \hline
 -\ 32 \\
 +\ 1\ 992
 \end{array}$$

Contents of accumulator (REPRESENTED in BCD: Binary Coded Decimal)  
 Akkumulatorinhoud: (VERTEENWOORDIG in BGD : Biner Gekodeerde  
 Desimaal):

✓
✓
✓
✓
 0001 1001 1001 0010

(5)  
[20]

**QUESTION 4**

Calculate:  $Y = 2(B + A - C) = + 2B + 2A - 2C = B+B +A+A+C+C$

✓

4.1

INSTRUCTION LOCATION	INSTRUCTION NWORD		DESCRIPTION
	OP-CODE	ADDRESS	
001	LDA	301	Load B
002	ADD	301	ADD B
003	ADD	300	ADD A
004	ADD	300	ADD A
005	SUB	302	SUB C
006	SUB	302	SUB C
007	OUT		Output
008	STP		Stop

✓

✓

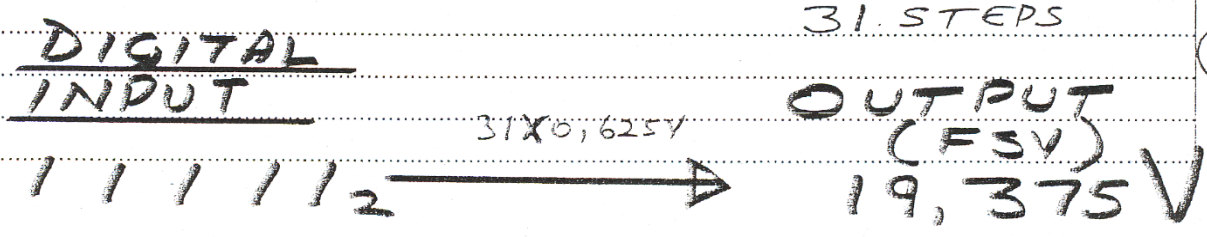
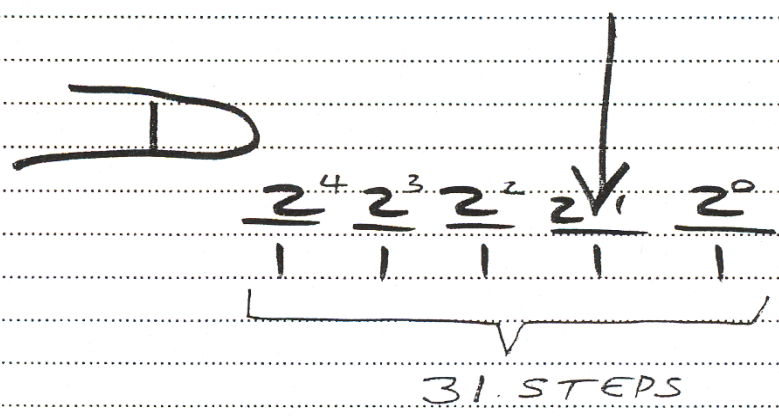
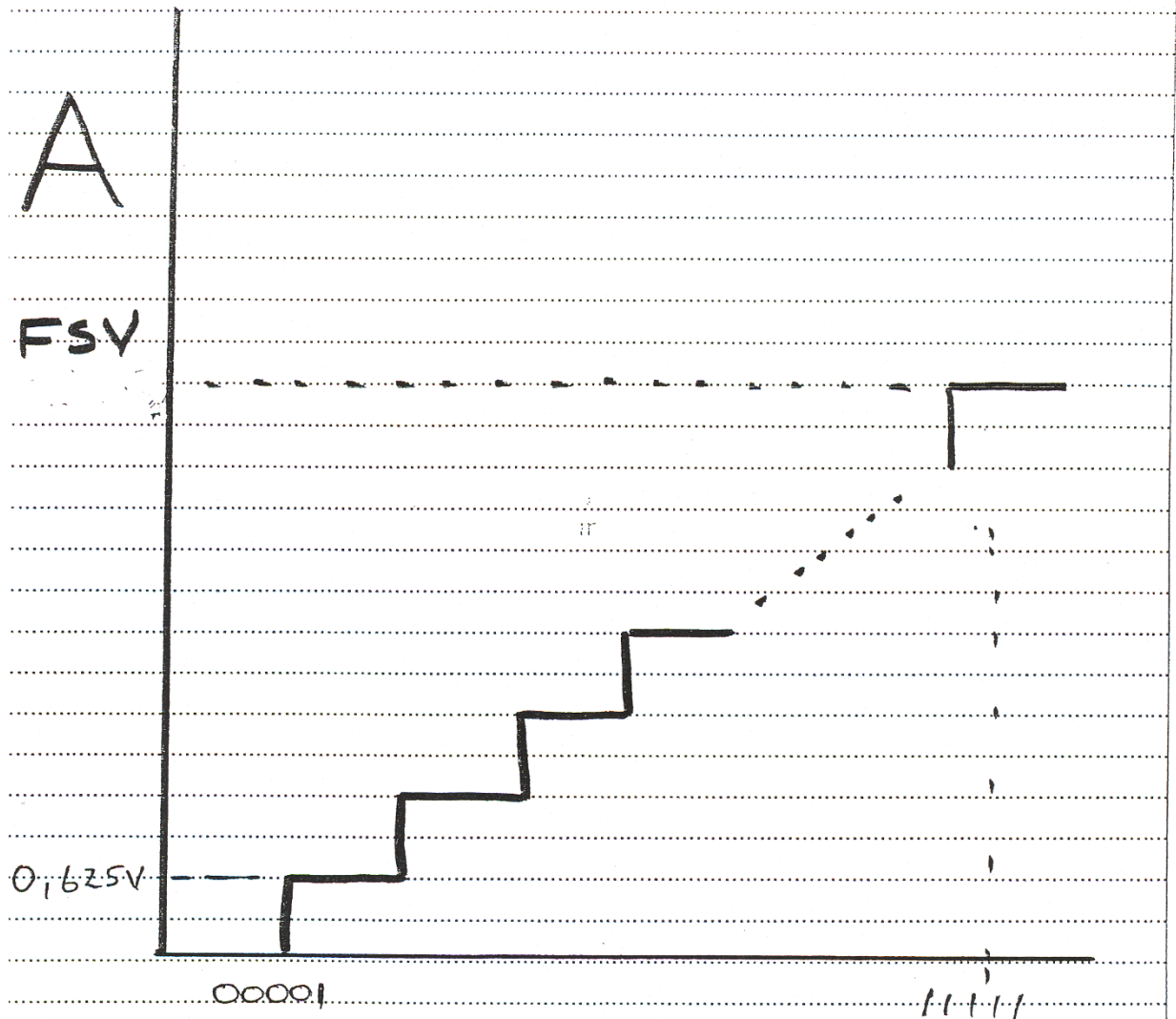
✓

✓

✓✓

(7)

4.2 DIGITAL TO ANALOGUE CONVERSION

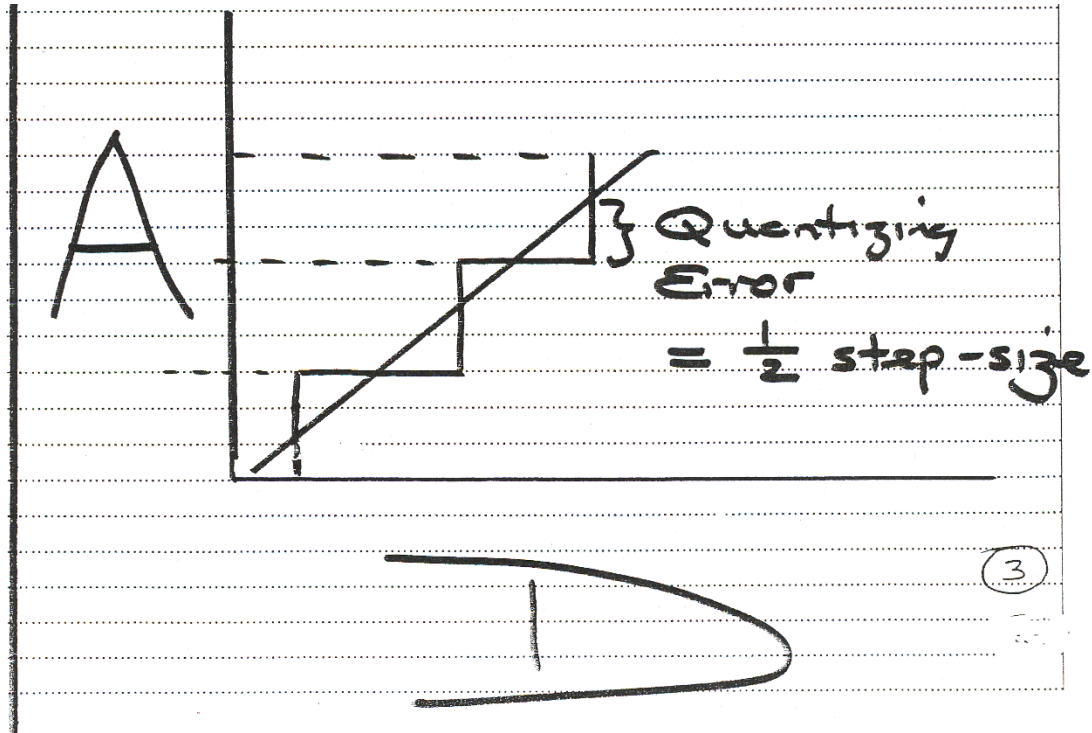


✓ ✓ ✓ ✓ ✓ (4)



4.3 Quantising error: As shown on the sketch below the quantising error of a D/A converter (an ideal D/A converter where other errors are assumed to be zero) cannot be less than half the resolution (i.e. half the step-size of the converter).

The reason is that the converter switches the output in discrete steps at the half-way mark on each step.

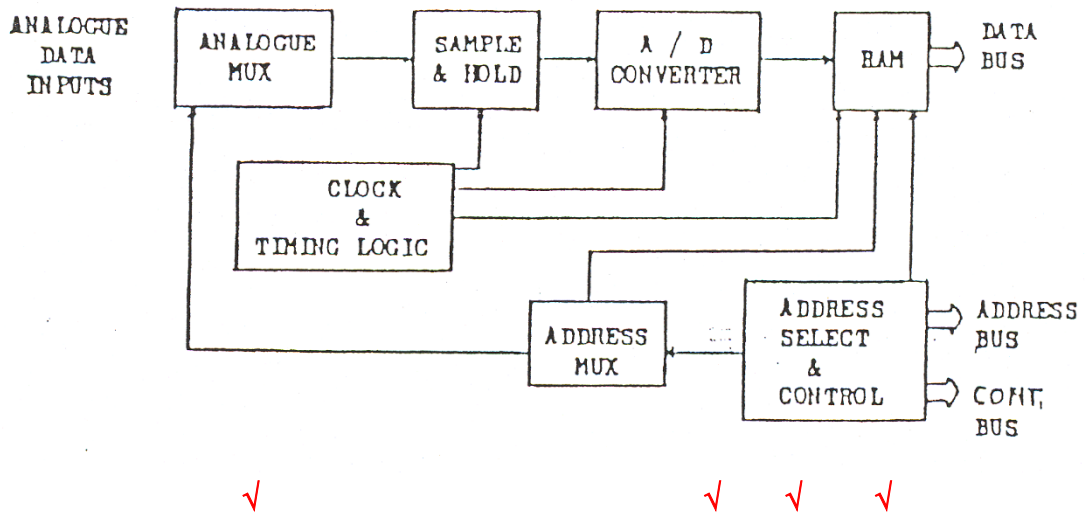


✓

✓

(3)

4.4 Most efficient manner of data acquisition: Autonomous load into RAM



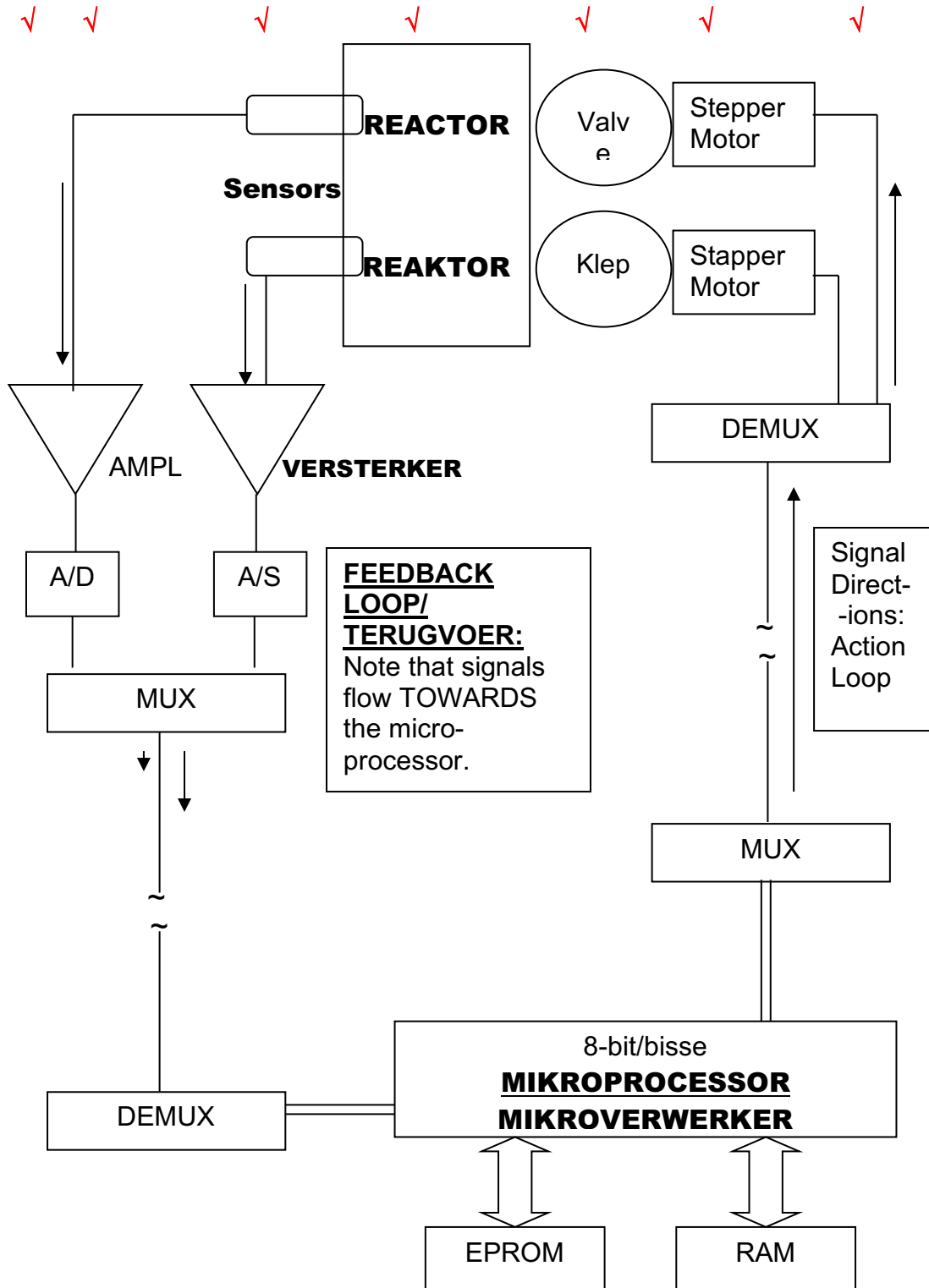
(4)

4.5 Once this is accomplished data can be accessed from RAM using a programming instruction for obtaining data from memory. This is obviously the simplest way to access the data: You just have to know how to program and to use instructions like LOAD.

(2)  
[20]

**QUESTION 5**

5.1 REACTOR PROCESS CONTROL



✓ ✓ ✓ ✓ ✓

(10)

5.2	5.2.1	TRUE Cellular telephone networks are run by digital computers.		
	5.2.2	TRUE The computer switches you to the cell with the STRONGEST signal.		
	5.2.3	TRUE These frequencies are the TONES on the modem.		
	5.2.4	TRUE PCM can transmit alphanumeric data: LETTERS AND NUMBERS		
	5.2.5	FALSE Hamming code is a DIGITAL code. It uses the BINARY number system.	(5 × 2)	(10) <b>[20]</b>
				<b>100</b>