

higher education & training

Department: Higher Education and Training REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

DIGITAL ELECTRONICS N6

8 April 2021

This marking guideline consists of 7 pages.

Please turn over

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SECTION A

QUESTION 1

1.1	1.1.1 1.1.2 1.1.3 1.1.4 1.1.5	B C D B B		
			(5 × 1)	(5)
1.2	1.2.1 1.2.2 1.2.3 1.2.4 1.2.5	High-level languages BASIC or FORTRAN or COBOL or any other valid answer Machine code Compiling Translating	(5 × 1)	(5)
4.0	4.0.4		()	(-)
1.3	1.3.1 1.3.2 1.3.3 1.3.4	D A C G		
	1.3.5	E	(5 × 1)	(5)
1.4	1.4.1	True		
	1.4.2	False		
	1.4.4	False		
	1.4.5	Irue	(5 × 1)	(5)
1.5	1.5.1 1.5.2 1.5.3	Bug 8086 Flow chart		
	1.5.4 1.5.5	RAM Real-time computing	(5 × 1)	(5)
1.6	1.6.1 1.6.2 1.6.3 1.6.4	modem UART Windows 1,023 V		
	1.6.5	associative	(5 × 1)	(5) [30]

TOTAL SECTION A: 30

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SECTION B

QUESTION 2





QUESTION 3

- 3.1 Data selection
 - Data routing
 - Operation sequencing
 - Parallel-to-serial conversion
 - Waveform generation
 - Logic function generation

3.2 Pulse distribution



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(Any 3 × 1)

(3)

(1)

- Transmit side changes the high-frequency signals from a digital device into frequency shift keying for transmission across the telephone wires.
 - Receive side changes the frequency shift keying audio tones from the telephone wires into high-frequency signals for the digital device.



(NOTE: Any wave train can be drawn as long as the frequencies on the 1 are visibly higher than the frequencies on the 0 and these frequencies must show constant amplitudes throughout.)

QUESTION 4

3.5



(2)

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4.2

-		FEICH ROUTIN	E	
First microin:	struction: Pulse 1			
PC Contents	—► MAR	l [c	NSTRUCTION DP-CODE PLUS	OPERAND
PC	- MAR	L	► MBR	ADDRESS
Programcoun	ter Memory Address	R		4BR
	Register			
Second micro	instruction: Pulse 2	2		
INSTRUCTIO	N [OP-CODE PL → = INSTRU	US THE OPERA	AND ADDR.] ER	
MBR	1111_0010		INSTRU	CTION
L				-1
Third microins	struction: Pulse 3	e		
Program count	ter incremented	PC = PC + 1		
		◄ 1011		
	EXEC			
L	10011 C 10 1000 10			
	Lennandyn yr de'i ys fed ydar da'n gan yr araf yn yr araf yn yr			
Fourth microins	struction: Pulse 4	4 8		
nstruction-wor	d is SPLIT:			
OP-(
		ecoder 11		1
I.K			MAR	
	OF-CODE	ADDRES	0010	
-				
Fifth microinstru	uction: Pulse 5			and the second
PERAND	ISLOA			
	TOLOA		ACCUMULAIO	ĸ
AM	MBR		C. 1110	
	un de la filma de la desana de la			
anna ann i fra Calanda a bha ann an a				
ixth microinstru	otion Dulco 6			
ixth microinstru	C'PHASE (i.a. not	thing honnens dur	ing this pulse)	

(10) **[20]**

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QUESTION 5

5.1

5.2

PASS	MONTY	PYTHON	ANSWER
0	8	12	20
	16		
1			28
	24		
2			36
	32		

36 32

12

NOTE:

- 1. The column 'PASS' can start on 1 and not 0.
- Each correct row (the dashed lines do not have to be included) is worth 1 marks no half marks. Mistakes must not be followed through. (6 × 1)
- 3. The final printout below the table must be in the correct order, one below the other for 1 mark.

(1)

(6)

- The cost of a new system or expansion of the existing system
 - Hiring of additional an specialised personnel
 - Training of personnel
 - Advantages and benefits that can be derived from the proposed system
 - Environmental considerations
 - Problem areas as well as possible solutions
 - Commissioning and installation
 - Service and backup facilities
 - Data files and format requirements at both input and output terminals
 - Future expansion and estimated lifetime of the system

(5) [**12**]

 $(Any 5 \times 1)$

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QUESTION 6

6.1	11 02 13 04 15 16 17 08 19 110			
	Pos. 1 checks 3; 5; 7; 9 1 1 1 1 − P1 should thus be 0: NOT thus: 1 ✓✓			
	Pos. 2 checks 3; 6; 7; 10 1 1 1 0 – P2 should thus be 1: IT IS thus: 0 ✓✓			
	Pos. 4 checks 5; 6; 7 1 1 1 – P4 should thus be 1: NOT thus: 1 $\checkmark\checkmark$			
	Pos. 8 checks 9; 10 1 1 – P8 should thus be 0: IT IS thus: 0 $\checkmark\checkmark$			
	Thus the fault lies on bit $0101_2 = 5_{10} \checkmark$			
	Thus pos.5 which is a 1 should be a 0,			
	i.e. the word should be: 1010011011 _{hamming} ✓			
6.2	+0,00110000 × 10 ⁺¹⁰⁰ \checkmark = 11 ₂ \checkmark = 2 + 1 = 3 ₁₀ \checkmark	(3) [13]		

TOTAL SECTION B: 70 GRAND TOTAL: 100