



Cambridge International Examinations
Cambridge International Advanced Level

COMPUTER SCIENCE

9608/31

Paper 3 Written Paper

October/November 2016

MARK SCHEME

Maximum Mark: 75

Published

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- 1 (a) +2.5**
- = 010100000000 0010 [3]
 Give full marks for correct answer (normalised or not normalised)
- = 10.1 [1]
 = 0.101×2^2 // evidence of shifting binary point appropriately [1]
- [Max 3]**
- (b) –2.5**
- 101100000000 0010
 Give full marks for correct answer
- One's complement of 12-bit mantissa of +2.5 101011111111 – allow f.t. [1]
 +1 to get two's complement 101100000000 [1]
- [Max 3]**
- (c) 3** [3]
 Give full marks for correct answer
- = 0.011×2^3 // exponent is 3 [1]
 = $11.0 // (1/4 + 1/8) \times 8$ [1]
- [Max 3]**
- (d) (i) Not normalised** [1]
- (ii)** First two bits should be different for normalised number
 // because the number starts with 00 [1]
- (e) reduced accuracy** [1]
increased range [1]

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2 (a)

Statement

This stage removes any comments in the program code

This stage could be ignored

This stage checks the grammar of the program code

This stage produces a tokenised version of the program code

Compilation stage

Lexical analysis

Syntax analysis

Code generation

Optimisation

1 mark for each correct line

[4]

- (b) (i) $AB + CD - *$

[1]

[1]
- (ii) $A - B / 4 * CD - /$

[1]

[1]

[1]

(c) (i)

		4		3		
	1	1	5	5	2	
2	2	2	2	2	2	4
		+		-	*	

1 mark per ring

[4]

- (ii) $x * (w + z - y)$

Order must be correct for both parts

[1]

[1]
- (iii) No need for rules of precedence

No need for brackets

In RPN evaluation of operators is always left to right

[1]

[1]

[1]
- [Max 2]

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- 3 (a) The 245th page frame from the start of memory
// the 245th page frame from some base address [1]

- (b) Flash memory // magnetic disk // hard drive [1]

- (c) (i) Time of entry (NOT time in memory) [1]

(ii)

Page	Presence Flag	Page frame address	Additional data
4	1	542	12:07:34:49

[1 +1 + 1]

- (iii) Number of times the page has been accessed [1]

(iv)

Page	Presence Flag	Page frame address	Additional data
3	1	132	0

[1 +1 + 1]

Accept only zero for 'additional data'

- (d) For example:
Longest resident: page in for lengthy period of time may be being accessed often [1]
 ... so not a good candidate for being removed [1]

Least used: a page just entered has a low least used value ... [1]
 so likely to be a candidate for immediately being swapped out [1]

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4 (a) (i)

Input		Output	
X	Y	A	B
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

1 mark for each
correct column
(A and B)

[2]

(ii) Half adder

[1]

(iii) C // Carry
S // Sum

[1]

[1]

represents the carry part of the addition of two bits

[1]

represents the sum part of the addition of two bits

[1]

(b) (i) A.

[1]

(A.B + C)

[1]

(ii) Allow follow through from (b)(i)

A.(A.B+C)

= A.A.B + A.C**= A.B + A.C****= A.(B+C)**

1 mark for each correct simplification line – max 2

[2]

1 mark for A.(B+C) if correct answer to part (b)(i)

[1]

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5 (a) (i)

Application	[1]
Transport	
Internet	[1]
Network / Link	[1]

(ii) software / module / program / code [1]

- (b) (i) For example:
- check packet port ... [1]
 - to identify the application type [1]
 - check packet destination socket ... [1]
 - so that packet sent to correct application [1]
 - check incoming packet sequence number ... [1]
 - to ensure data is reassembled in correct order [1]
 - recalculate checksum of packet ... [1]
 - to ensure integrity of packet [1]
 - if packet checksum invalid ... [1]
 - send message to have packet retransmitted [1]

[Max 2 tasks]

[Max 4]

(ii) HTTP / HTTPS [1]

(iii) POP3 [1]

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6 (a)

Description	Term	
Malware which attaches itself to another program.	VIRUS	[1]
Malware designed to redirect the web browser to a fake website.	PHARMING	[1]
Email that encourages the receiver to access a website and give their banking details.	PHISHING	[1]

(b) (i) Plain text is the original text [1]

Cipher text is the encrypted version of the plain text [1]

- (ii) Asymmetric keys means that the key used to encrypt (public key) is different from the key used to decrypt (private key) [1]
 Ben acquires Mariah's public key [1]
 Ben encrypts email ... [1]
 using Mariah's public key [1]
 Ben sends encrypted email to Mariah [1]
 Mariah decrypts email ... [1]
 Using her private key [1]

[Max 4]