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	<u>101011111111</u>	– allow f.t.	[1]
+1 to get two's complement	<u>101100000000</u>		[1]

[Max 3]

(c) 3 [3]
Give full marks for correct answer

= $0.011 \text{ X } 2^3$ // exponent is 3 [1]
= 11.0 // (1/4+1/8) * 8 [1]

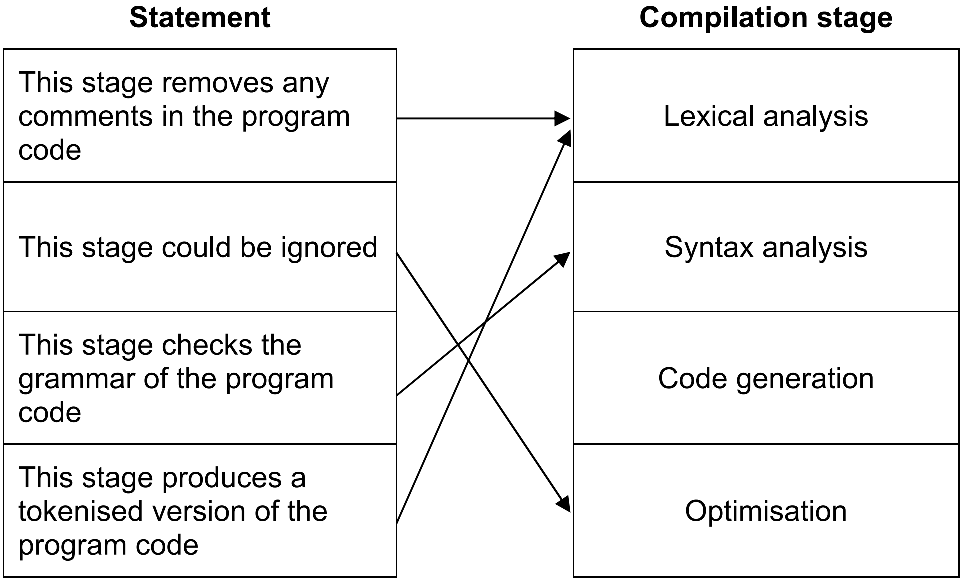
[Max 3]

(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]

2 (a)



1 mark for each correct line

[4]

(b) (i) A B + [1]
C D – * [1]

(ii) A – [1]
B / 4 * [1]
C D – / [1]

(c) (i)

		4		3		
	1	1	5	5	2	
2	2	2	2	2	2	4
		+		–	*	

1 mark per ring

[4]

(ii) x * [1]
(w + z – y) [1]
Order must be correct for both parts

(iii) No need for rules of precedence [1]
No need for brackets [1]
In RPN evaluation of operators is always left to right [1]

[Max 2]

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]

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 [1]
S // Sum [1]

represents the <u>carry part of the addition of two bits</u> [1]
represents the <u>sum part of the addition of two bits</u> [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]

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]

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]