COMPUTER SCIENCE **9608/33**

Paper 3 Written Paper **October/November 2016**

MARK SCHEME

Maximum Mark: 75

Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.
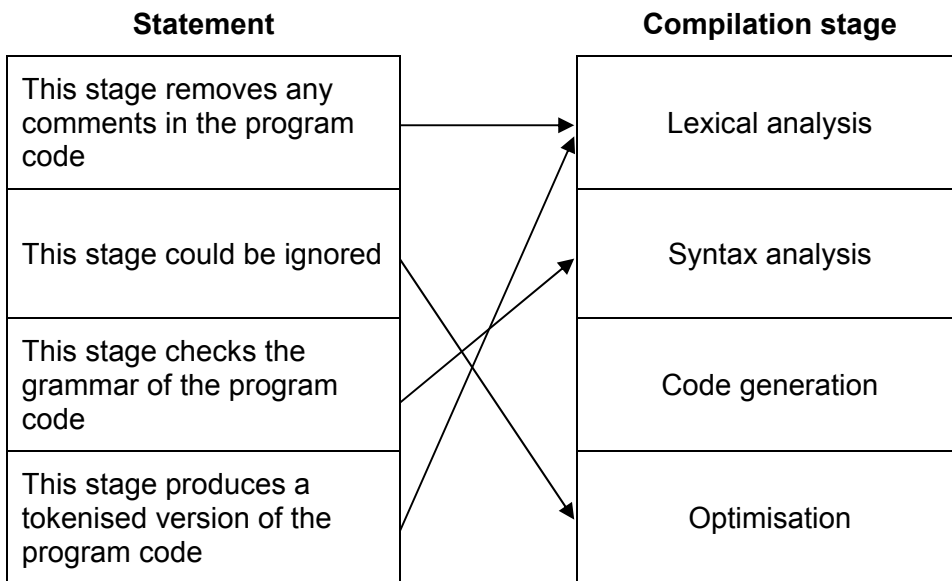
Cambridge will not enter into discussions about these mark schemes.

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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

   = 0.011×2^3 // 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)

Statement		Compilation stage
This stage removes any comments in the program code		Lexical analysis
This stage could be ignored		Syntax analysis
This stage checks the grammar of the program code		Code generation
This stage produces a tokenised version of the program code		Optimisation

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 <u>original</u> text [1]

Cipher text is the <u>encrypted</u> 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 <u>public key</u> [1]
Ben <u>encrypts</u> email … [1]
using Mariah's <u>public</u> key [1]
Ben sends <u>encrypted email</u> to Mariah [1]
Mariah <u>decrypts</u> email … [1]
Using her <u>private</u> key [1]

[Max 4]