Cambridge International A Level

Cambridge International Examinations
Cambridge International Advanced Level

COMPUTER SCIENCE **9608/32**

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

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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.

Cambridge is publishing the mark schemes for the October/November 2016 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

© UCLES 2016

1 (a) +3.5
01110000 00000010 [3]
Give full marks for correct answer (normalised or unnormalised)

= 11.1 [1]
= 0.111×2^2 // evidence of shifting binary point appropriately [1]

[Max 3]

(b) –3.5
10010000 00000010 [3]
3 marks for correct answer

One's complement of 8-bit mantissa for +3.5 10001111 – allow f.t. [1]
+1 to get two's complement 10010000 [1]

[Max 3]

(c) 14 [3]
3 marks for correct answer

$=0.111 \text{ X } 2^4$ // exponent is 4 [1]
=1110.0 / (1/2 + 1/4 + 1/8) * 16 [1]

[Max 3]

(d) (i) Normalised [1]

(ii) Leftmost two bits are different for normalised representation
// because the pattern starts with 01 [1]

(e)

1	0	0	0	0	0	0	0

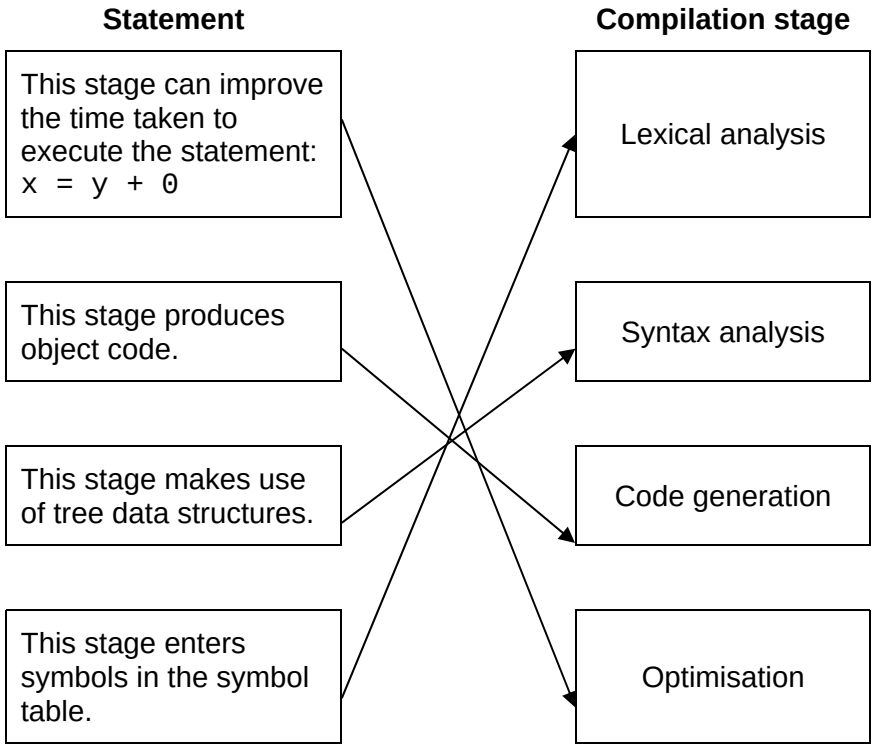
[1]

0	1	1	1	1	1	1	1

[1]

© UCLES 2016

2 (a)

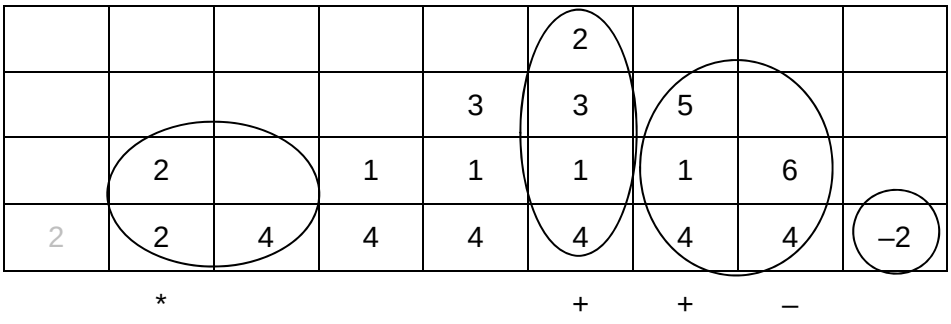


1 mark for each correct line

[4]

(b) P Q + [1]
R S / – [1]

(c) (i)



1 mark per ring

[4]

(ii) b * a [1]
– (c + d + a) [1]
Order must be correct for both parts

(iii) Rules of precedence means different operators have different priorities // by example multiply is done before add [1]
In RPN evaluation of operators is left to right // operators are used in the sequence in which they are read [1]
No need for brackets // infix may require the use of brackets [1]

[Max 2]

© UCLES 2016

3 **(a)** The page is present in memory [1]
Loaded at / stored /present in page frame 542 // its memory address is 542 [1]

(b) **(i)** Next instruction is first instruction in Page 6 [1]
Page 6 is not present in memory [1]
Instruction can only be executed if present in memory [1]
Program cannot continue until Page 6 is loaded [1]

[Max 2]

(ii) When there is an attempt to load an instruction for a page not in memory [1]
A page fault occurs // Page 5 finishes … [1]
this generates an interrupt [1]
ISR code is executed [1]
Causes the OS to load page 6 into memory [1]

[Max 3]

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

(ii)

Page	Presence Flag	Page frame address	Additional data
6	1	221	12:07:34:49

[1 + 1 + 1]

(iii) When the procedure call is made – Page 1 is swapped out and Page 3 is swapped in [1]
At the end of the procedure call – Page 3 is swapped out and Page 1 is swapped in [1]
Page 1/3 is always in memory shortest amount of time [1]
The entire sequence is repeated for every iteration [1]

[Max 3]

(iv) Thrashing // continually swapping pages [1]

© UCLES 2016

4 (a) (i) A set of rules … [1]
governing communications/transmission of data /sending and receiving data [1]

(ii) For example, (Web) browser / email client [1]

(iii) For example, Web server / email server [1]

(iv) Security //example: for example, alteration of transmitted messages [1]
Privacy // for example, only intended receiver can view data [1]
Authentication // for example, trust in other party [1]

[Max 2]

(b) For example:

which protocol will be used… [1]
there are a number of different versions of the two protocols [1]
session ID … [1]
uniquely identifies a related series of messages between server and client [1]
session type … [1]
reusable or not [1]
encryption method … [1]
public / private keys to be used // asymmetric/ symmetric [1]
authentication method … [1]
use of digital certificates / use of digital signature [1]
compression … [1]
method to be used [1]

[Max 2 parameters]

[Max 4]

(c) For example:

banking [1]
private / <u>secure</u> email [1]
shopping [1]
financial transactions [1]
<u>secure</u> file transfer [1]

[Max 2]

© UCLES 2016

5 (a) (i)

Input			Working space	Output	
P	Q	R		J	K
0	0	0		0	0
0	0	1		0	1
0	1	0		0	1
0	1	1		1	0
1	0	0		0	1
1	0	1		1	0
1	1	0		1	0
1	1	1		1	1

1 mark each column

If zero marks then
6 or 7 pairs correct – 1 mark

[2]

(ii) Full adder [1]

(iii) C / Carry [1]
S / Sum [1]
represents the carry part of the addition of three bits [1]
represents the sum part of the addition of three bits [1]

(b) (i) A. [1]
(A+B).C [1]

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

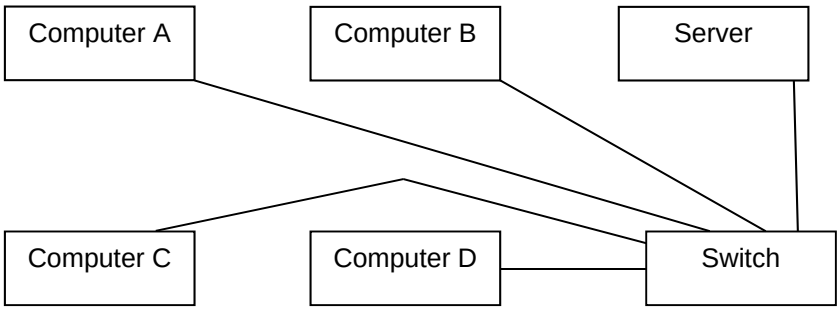
A. ((A+B).C)
= A.(A.C + B.C)
= A.A.C +A.B.C
= A.C + A.B.C
= A.C (1 + B)
=A.C.1
= A.C

1 mark for each correct simplification line – max 3 [3]
1 mark for A.C if correct answer to part **(b)(i)** [1]

[4]

© UCLES 2016

6 (a)



4 × Computer to Switch [1]

Server to Switch [1]

(b)

Statement	True	False	
All packets must be routed via the server.		✓	[1]
Computer B can read a copy of the packet sent from the Server to Computer A.		✓	[1]
No collisions are possible.	✓		[1]

(c) (i) Router / Switch / Bridge [1]

(ii) Router uses IP addresses in making decisions [1]
Router has routing table [1]
Routing table has entry for associated network ID // routing table has entry for host address // routing table used to make decision on where to route packet [1]

Switch / Bridge use MAC addresses [1]
MAC address table created [1]
Switch / bridge use MAC address table to make decision on where to route packet [1]

[Max 2]

© UCLES 2016