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

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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)

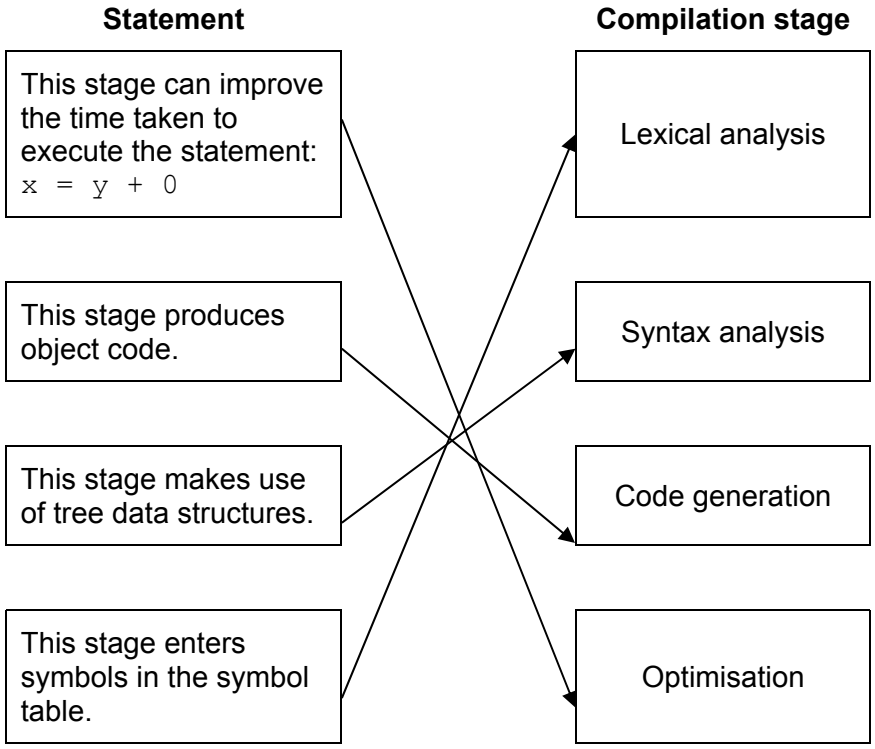
1	0	0	0	0	0	0	0

[1]

0	1	1	1	1	1	1	1

[1]

2 (a)

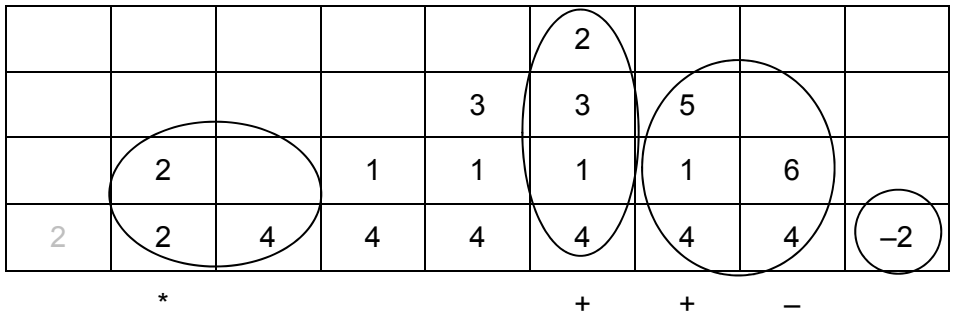


1 mark for each correct line

[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]

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]

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]

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]

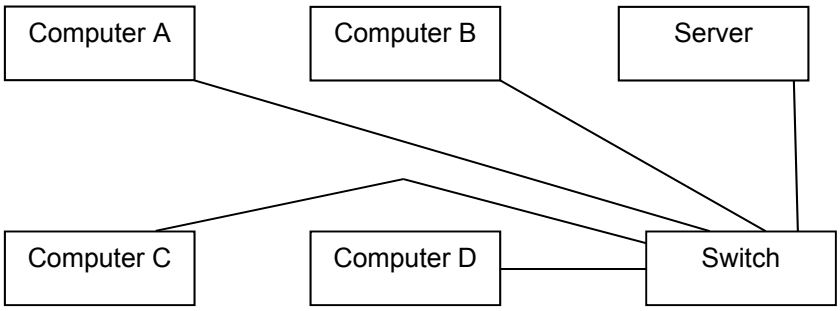
(ii) Allow follow through from **(b)(i)**

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]

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]