

CANDIDATE
NAME

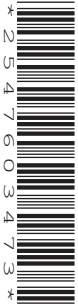
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CENTRE
NUMBER

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INFORMATION TECHNOLOGY

Paper 3 Advanced Theory

9626/32

May/June 2019

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Calculators must not be used on this paper.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

Any businesses described in this paper are entirely fictitious.

This document consists of **17** printed pages and **3** blank pages.

- 1 (a) Describe how the features of a 4G cellular communications system improve the ability of a smartphone to complete the download of a video file from the internet.

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..... [4]

- (b) 5G cellular communications systems promise significant improvements compared to 4G. Describe **two** ways that these improvements may affect the use of smartphones.

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2 Lasers can be used to create a data link between devices without using cables.

(a) Describe **two** applications for this method of data transmission.

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..... [2]

(b) Describe **one** drawback of this method of data transmission.

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..... [1]

- 3 An author has written the source code of a web page that will be used when a person applies for a driving licence. The code, shown in Fig. 3.1, is intended to check that a person is at least 16 years of age.

The lines of the code are numbered only for your convenience when referring to the code. The JavaScript code is in lines 8 to 19.

```

1  <html>
2  <body>
3  <p>You can apply for a licence to drive when you are 16 years
   old.</p>
4  <p>To check if you are old enough to drive, input your age and
   click the button:</p>
5  <input id="AgeNow" value="16" />
6  <button onclick="CheckAgeFunction()">Check now</button>
7  <p id="AgeCheck"></p>
8
9      function CheckAgeFunction()
10     var AgeNow;
11         AgeNow = Number(document.getElementById("AgeNow").value);
12         if (isNaN(AgeNow)) {
13             CanApply = "Please enter your age in numbers.";
14         } else {
15             CanApply = (AgeNow >15)? "You are too young to apply
   for a licence.": "You are old enough to apply for a licence.";
16         }
17         document.getElementById("AgeCheck").innerHTML = CanApply;
18     }
19
20 </body>
21 </html>

```

Fig. 3.1

Testing has shown that the code contains a number of errors of different types which must be corrected before the code will perform as expected.

Identify the line numbers containing the errors. Explain why each of the errors prevents the code from running correctly and how each should be corrected. Use the table for your response.

Line number of error and explanation of error.	Explanation of suggested correction.

[8]

- 5 Fig. 5.1 shows a table of tasks for a building project. The tasks F, G, H, I, J and K, need to be carried out between the stages A, B, C, D and E. The project starts with stage A and ends with stage E. Stages B and C are milestones.

Task	Time (months) taken to complete task	Milestones	
		Task starts at	Task ends at
F	4	A	C
G	5	A	B
H	3	B	E
I	2	C	D
J	3	D	E
K	3	C	E

Fig. 5.1

- (a) (i) Draw an activity network diagram to represent the data in the table shown in Fig. 5.1.

[5]

- (ii) Calculate the critical path through the tasks.

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..... [2]

- 6 A packet switched network has routers at nodes labelled A, B, C, D, E, F, G and H. Each router stores its own 'routing table' which shows how it is connected to the other routers.

Router	Connected to routers:			
A	B			
B	A	C	D	
C	B	D	E	F
D	B	C	F	
E	C	F		
F	C	D	E	G
G	F	H		
H	G			

- (a) Complete the diagram by drawing routers C, D, E, F and G with connection lines to show how the routers are inter-connected to communicate with each other.



[3]

Router A regularly sends out packets to check that router H is reachable. When H receives a packet from A it sends a packet back to confirm that it is reachable.

Assume that each router takes zero time units to receive, process and resend a packet and that each packet takes six time units to travel from one router to the next.

(b) (i) Describe the shortest route that a packet can take from router A to router H.

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..... [1]

(ii) Calculate the shortest time taken for router A to receive an acknowledgement from router H confirming that H is reachable.

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..... [2]

(c) (i) Assuming that the packets visit each router only once, calculate the longest time it could take for router A to receive an acknowledgement from router H confirming that H is reachable.

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.....
..... [2]

(ii) Describe the route that the packets would take.

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.....
..... [1]

(d) An additional router, J, is to be added to reduce the time for packets to travel from router A to router H to a minimum. However, no further connections can be directly made to routers A and H.

(i) Describe where J would be placed to reduce the travel time to a minimum.

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.....
..... [1]

- (ii) Calculate the new minimum time that it would take for A to receive an acknowledgement that H was reachable.

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.....

..... [2]

7 Computing devices use network interface cards.

- (a) Describe the role of a network interface card.

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8 The photograph in Fig. 8.1 has been edited and is shown in Fig. 8.2.



Fig. 8.1



Fig. 8.2

Describe in detail how image editing tools could have been used to change the photograph in Fig. 8.1 to that shown in Fig. 8.2.

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..... [2]

9 Colour gradients can be used when filling shapes in digital images.

(a) Describe **two** properties of the filled shape that can be changed with the use of colour gradients.

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..... [2]

(b) Describe the **types** of gradient that can be used when filling a shape with colour.

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