MARKSCHEME

November 2013

INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY

Higher Level

Paper 3

11 pages

Examiners should be aware that in some cases, candidates may take a different approach, which if appropriate should be rewarded. If in doubt, check with your Team Leader.

If candidates answer more than the prescribed number of questions:

- In the case of an "identify" question read all answers and mark positively up to the maximum marks. Disregard incorrect answers.

- In the case of a "describe" question, which asks for a certain number of facts *eg* "describe two kinds", mark the **first two** correct answers. This could include two descriptions, one description and one identification, or two identifications.

- In the case of an "explain" question, which asks for a specified number of explanations *eg* "explain two reasons", mark the **first two** correct answers. This could include two full explanations, one explanation, one partial explanation *etc*.

1. **Describe *two* situations in which the use of a Global Positioning System (GPS) would fail to provide the information the taxi driver needs to find a customer's pick-up point.** *[4 marks]*

Answers may include:
- when signal is poor (*ie* GPS receiver is near high buildings) or system not functioning (*ie* not connecting to satellites) the driver is unable to find the location as they do not have the required knowledge of the city
- less than three satellites are visible from the location of the taxi or client, making a GPS position inaccurate or unobtainable
- where streets in different districts have the same name, the driver may inadvertently select the wrong street causing a delay in the passenger being picked up
- the GPS system may not pick the quickest or cheapest route to the passenger's location as the algorithms used to determine such routes may focus on designated and/or well known locations and/or the shortest route may take longer due to poor road conditions
- the GPS software may not be sufficiently up-to-date and does not recognize changes to road usage, such as newly designated one-way streets, street closures, road works *etc*
- the software may have bugs / errors in its logic (*ie* reliability issue) which give wrong positions or routes
- the hardware may have reliability issues (faulty components, bad manufacture, wear and tear *etc*) which may lead to incorrect positions and routes
- weather condition may also affect GPS, for example an extremely cloudy day, thunderstorm or even heavy rain can all affect the signal
- at certain times for political or malicious reasons GPS can be jammed or faked/spoofed
- customer gives the wrong address to the control centre and therefore the taxi software sends the taxi in the wrong direction
- customer's device gives an incorrect GPS location therefore the taxi goes the wrong way
- customer device can't get a signal for any of the reasons mentioned above.

Award [1 mark] for each situation identified and an additional [1 mark] for a description of the situation where the use of a Global Positioning System would not provide the information that the taxi driver needs to find a customer's pick-up point.
Award a maximum of [2 marks] for each situation.
Award a maximum of [4 marks] for the question.

2. **The control centre receives a request to pick up a customer. Explain how the integrated IT system** *(lines 55–61)* **can determine which taxi should be selected.** *[6 marks]*

Answer should <u>focus on how the system decides on which taxi is best</u>, but can also include a little about how the system get the information and how it then process it.

Answers may include:
- customer gives location to the control centre at *Red Dragon Taxi Company*
- staff member at the office inputs location of customer into the integrated IT (IIT) system
- a search may be done on the database to retrieve customer's address and details
- IIT system calculates determines which taxi is most appropriate for the journey based on relevant factors (*ie* amount of time, length of the journey) to reach customer
- IIT system software uses predefined settings to remove taxis that are occupied or do not meet the other criteria that may be incorporated into the integrated IT system (such as female driver only, ability to speak English, no shared taxi)
- the IIT system takes into consideration the shift ending time of the taxi driver to check whether a long journey would be possible
- the IIT System might consider previous bookings for that taxi driver to make sure the taxi is still in the area to fulfill previous planned journeys
- the IIT System might consider the amount of jobs a driver has already had that day when deciding between two possible taxis, so that workload/commission is balanced out evenly
- the IIT System might take into consideration the type of vehicle (size / wheelchair access *etc*) according to the needs of the customer
- a predetermined algorithm ranks the taxis that are available in order of appropriateness
- a message is sent to this taxi to inform the driver of the location of the customer
- a taxi will accept the job and therefore confirm that it has received and will act on the instructions, otherwise another taxi may be chosen instead
- a message may be sent to the customer to inform him/her of how long the taxi may take to arrive, the taxi registration number *etc*.

[1–2 marks]
A limited response that indicates very little understanding of the topic or the reason is not clear.

[3–4 marks]
A reasonable description of how the integrated IT system determines the most appropriate driver. The answer may be unbalanced and lack appropriate reasoning at the lower end of the band.

[5–6 marks]
A clear, detailed and balanced explanation of how the integrated IT system determines the most appropriate driver with clear evidence of technical understanding.

3.   **_Red Dragon Taxi Company_'s new integrated communication and dispatch system _(line 107)_ has the capability of recording information about customers and their journeys.**

With reference to your research, to what extent does the collection of customer information conflict with the customers' privacy?   *[8 marks]*

Answers may include:

- what data is *Red Dragon Taxi Company* recording about the customers?
- are the customers aware of the data that is being collected by *Red Dragon Taxi Company* and how it may be used? Are they required to agree to the collection and possible dissemination of the data? What are the advantages to *Red Dragon Taxi Company* of holding personal data?
- how feasible is it to record customers' data unless they register with *Red Dragon Taxi Company*? Must prospective customers register to take advantage of the service provided by *Red Dragon Taxi Company*? How appropriate is registration for many of the customers of *Red Dragon Taxi Company*?
- who has access to this data collected by *Red Dragon Taxi Company*? To what extent does the *Red Dragon Taxi Company* make prospective customers aware of how their personal information may be used?
- how long will the data be kept for, and how will it be destroyed after this time period has expired?
- what policies is *Red Dragon Taxi Company* considering implementing to ensure the privacy of the data held on its IT systems?
- if *Red Dragon Taxi Company's* data is held on a third party server, what measures are in place to ensure the privacy of customer data?
- what safeguards exist to prevent the future selling of customer data held by *Red Dragon Taxi Company*? What measures can be put in place to ensure the privacy of customers?
- will there by physical security at the data centre / server? IE locks, key cards, biometrics to prevent physical access by unauthorized people?
- will there be digital security measures to prevent unauthorized access and corruption (firewall, password access, anti-virus and anti-malware)
- to what extent does *Red Dragon Taxi Company* have a different understanding of the terms privacy, ethical data management and data security to that of its customers?
- sensitivity of the data – is it basic contact information, does it contain medical or other data such as religion, or what about credit card payments – are the credit cards numbers stored with the customer details
- the data recorded may be from during the actual journey, as well as about the journey (*ie* audio/video footage recorded by a CCTV/audio device in the taxi). This could therefore raise privacy concerns because conversations could be recorded.

SL and HL paper 1 part (c) and HL paper 3 question 3 markband

Marks	Level descriptor
No marks	• *A response with no knowledge or understanding of the relevant ITGS issues and concepts.* • *A response that includes no appropriate ITGS terminology.*
Basic **1–2 marks**	• *A response with minimal knowledge and understanding of the relevant ITGS issues and concepts.* • *A response that includes minimal use of appropriate ITGS terminology.* • *A response that has no evidence of judgments and/or conclusions.* • *No reference is made to the scenario in the stimulus material in the response.* • *The response may be no more than a list.*
Adequate **3–4 marks**	• *A descriptive response with limited knowledge and/or understanding of the relevant ITGS issues and/or concepts.* • *A response that includes limited use of appropriate ITGS terminology.* • *A response that has evidence of conclusions and/or judgments that are no more than unsubstantiated statements. The analysis underpinning them may also be partial or unbalanced.* • *Implicit references are made to the scenario in the stimulus material in the response.*
Competent **5–6 marks**	• *A response with knowledge and understanding of the relevant ITGS issues and/or concepts.* • *A response that uses ITGS terminology appropriately in places.* • *A response that includes conclusions and/or judgments that have limited support and are underpinned by a balanced analysis.* • *Explicit references to the scenario in the stimulus material are made at places in the response.*
Proficient **7–8 marks**	• *A response with a detailed knowledge and understanding of the relevant ITGS issues and/or concepts.* • *A response that uses ITGS terminology appropriately throughout.* • *A response that includes conclusions and/or judgments that are well supported and underpinned by a balanced analysis.* • *Explicit references are made appropriately to the scenario in the stimulus material throughout the response.*

4. ***Red Dragon Taxi Company* has found that there is a wide range of IT systems available that could meet their needs and be implemented by July 2014. With reference to your research, discuss the criteria that could be used to evaluate these systems.**   *[12 marks]*

Examiners need to be aware that students may mention specific features that the system should have which should be accepted only if this is inside one of the criteria mentioned, such as "features of the system". It is not valid if the focus of the response deals with features of the system only.

Answers may include:
Economic
- initial costs of purchasing the system and/or finance packages available. What value will the integrated communication and dispatch system add to *Red Dragon Taxi Company*?
- possible additional costs such as system upgrades. What is included? What is not? To what extent is the system structured so that some system modules can be purchased as needed to delay costs?
- possible licensing costs to run and maintain the integrated communication and dispatch systems
- development costs for new features
- training costs for existing staff
- data costs for updating data (*eg* map data on GPs / GIS systems).

Functionality
- the software should fulfil all of the requirements of the *Red Dragon Taxi Company* which will have been laid out in the requirements specification
- the functionality of the software may go beyond the requirements of the *Red Dragon Taxi Company* and also have features which are useful
- the software should not have many extra features which are not useful to the *Red Dragon Taxi Company* as this may confuse users or affect the performance of the software
- the speed and performance of the software as well as the capacity for storage of information is adequate for present and future needs.

Question 4 continued

Usability / ease of implementation / changeover for *Red Dragon Taxi Company* and taxi drivers
- how well does the software operate with existing IT systems?
- how much data can be transferred/migrated to the integrated communication and dispatch system?
- how much training is required by the staff in the *Red Dragon Taxi Company* offices to work with the integrated communication and dispatch system?
- what refinements are necessary for drivers working for *Red Dragon Taxi Company* to be able to utilise the integrated communication and dispatch system?
- how important for Red Dragon Taxi Company is it that the software is intuitive? Is it preferable to have a cheaper solution that can be more rapidly implemented and train the staff to use it?
- how urgent is the need to adopt the new integrated communication and dispatch system?
- how quickly can the project be completed (does it fit in the timeline that the *Red Dragon Taxi Company* have thought of)?

Standards and Protocols / Technology
- is the software future-proof?
- does it implement the latest standards and versions
- is it compatible with other related products and data sources
- is it compatible with any legacy systems the company already has?

The company providing the software
- does the company have a good reputation or positive track record?
- is the company financially stable and guaranteed to exist for the life of the product
- are there references / proof from existing customers/users of the software

Support provided by the software developers of the integrated communication and dispatch system
- what are the Service Level Agreements available with the integrated communication and dispatch systems? (*ie* response time, levels of service)
- is the support for the system confined to that provided by the software developer, or are there user forums that *Red Dragon Taxi Company* can use to resolve issues with the software? How reliable are these forums?

Cost benefit analysis
- to what extent do the weightings of the different criteria selected vary? How much will this influence a final decision?
- how important are the different phases associated with the implementation of a new integrated communication and dispatch system? For example, is it more important that the new integrated communication and dispatch system is implemented without a rigorous stakeholder analysis? How much emphasis should be placed on the planning stage?

Question 4 continued

Organisational benefits / customer satisfaction
- to what extent will the integrated communication and dispatch system improve the management and efficiency of the service provided by *Red Dragon Taxi Company*? Is it worth the investment?

N.B. Many of these points may be expressed across a range of different criteria.

HL paper 3 question 4 markband

Marks	Level descriptor
No marks	• *A response with no knowledge or understanding of the relevant ITGS issues and concepts.* • *A response that includes no appropriate ITGS terminology.*
Basic **1–3 marks**	• *A response with minimal knowledge and understanding of the relevant ITGS issues and concepts.* • *A response that includes minimal use of appropriate ITGS terminology.* • *A response that has no evidence of judgments, conclusions or future strategies.* • *No reference is made to the information in the case study or independent research in the response.* • *The response may be no more than a list.*
Adequate **4–6 marks**	• *A descriptive response with limited knowledge and/or understanding of the relevant ITGS issues and/or concepts.* • *A response that includes limited use of appropriate ITGS terminology.* • *A response that has evidence of conclusions, judgments or future strategies that are no more than unsubstantiated statements. The analysis underpinning them may also be partial or unbalanced.* • *Implicit references are made to the information in the case study or independent research in the response.*
Competent **7–9 marks**	• *A response with knowledge and understanding of the relevant ITGS issues and/or concepts.* • *A response that uses ITGS terminology appropriately in places.* • *A response that includes future strategies, conclusions and/or judgments that have limited support and are underpinned by a balanced analysis.* • *Explicit references to the information in the case study or independent research are made at places in the response.*
Proficient **10–12 marks**	• *A response with a detailed knowledge and understanding of the relevant ITGS issues and/or concepts.* • *A response that uses ITGS terminology appropriately throughout.* • *A response that includes conclusions, judgments or future strategies that are well supported and underpinned by a balanced analysis.* • *Explicit references are made appropriately to the information in the case study and independent research throughout the response.*