



Mark Scheme (Results)

October 2021

Pearson Edexcel International Advanced
Subsidiary

In Information Technology (WIT13/ 01)
Unit 3

Question number	Answer	Additional guidance	Mark
1 (a) (i)	<p>Award one mark for each of the following up to a maximum of two marks:</p> <ul style="list-style-type: none"> • Velocity / Speed of collection (1) • Variety / Range of data types collected / Mix of structured and unstructured data (1) • Veracity / Accuracy or quality (1) • Value / Actual or potential usefulness of analysing the data (1) 		2
1 (a) (ii)	<p>Award one mark for any of the following infrastructure requirements:</p> <ul style="list-style-type: none"> • Processing power/capacity (1) • Complexity of algorithms / Software for analysis (1) • Storing/Analysing related data over several sites (1) • Fast/high capacity WAN (1) 		1

Question number	Answer	Additional guidance	Mark
1 (b)	<p>Award one mark for a bottleneck and one mark for a matching solution.</p> <p>Answers may include:</p> <ul style="list-style-type: none"> • on-site space/scalability (bottleneck) (1) use of cloud storage for the data/having facility to send overflow data to cloud/other storage (1) • network speed/connectivity (bottleneck) (1) use of optical fibre/high speed switches/network devices (1) • internet speed/connectivity (bottleneck) (1) arrange for direct connection to internet backbone/switch to better performing ISP (1) • processing speed/power (bottleneck) (1) faster/more processors (1) 	Do not accept a software related problem or solution.	2

Question number	Answer	Additional guidance	Mark
1 c (i)	<p>Award up to two marks for a linked explanation:</p> <p>Answers may include:</p> <ul style="list-style-type: none"> • A DBMS deals with structured data/a schema (1) Big Data contains unstructured data / is non-schema (1) • A DBMS deals with a (one) database containing relational data (1) Big Data may not be held in a database/a single database/a relational database (1) 		2
1 c (ii)	<p>Award up to two marks for a linked description.</p> <p>Answers may include:</p> <ul style="list-style-type: none"> • A (secret) key is generated (by the company)/uses common key (1) • Key is distributed (to all airports) / different key sent to each airport/location (1) • Key is used for sending and receiving data/used to encrypt and decrypt (between company and airport) (1) 		2
1 c (iii)	<p>Award up to two marks for a linked explanation, such as:</p> <ul style="list-style-type: none"> • asymmetric is slower/symmetric is faster to encrypt/decrypt/process data (1) <p>And a suitable expansion, such as:</p> <ul style="list-style-type: none"> • Big Data/company needs timely/fast data processing/analysis (1) • slower encryption/decryption could produce a bottleneck/reduce the value of the data/prevent timely analysis (1) • less timely/current data at airports/company sites will be less useful (1) 		2

Question number	Answer	Additional guidance	Mark
1 d (i)	Award up to two marks for: <ul style="list-style-type: none">• Components located on different machines/computers/sites that communicate/coordinate actions (1)• so that they appear as one system/machine to users (1) OR <ul style="list-style-type: none">• A group of computers that have a shared state and operate concurrently/together (1)• if one fails it does not affect (the uptime of) the rest of the system / the rest of the system continues to work (1)		2
1 d (ii)	Award one mark for any of: <ul style="list-style-type: none">• updates may be lost/overwritten / data integrity may be lost (1)• queries from different locations may get different results (1)• (data locks) may slow down responses/prevent transactions (1)• data cannot be guaranteed to be consistent/reliable (across the whole system) (1)		1

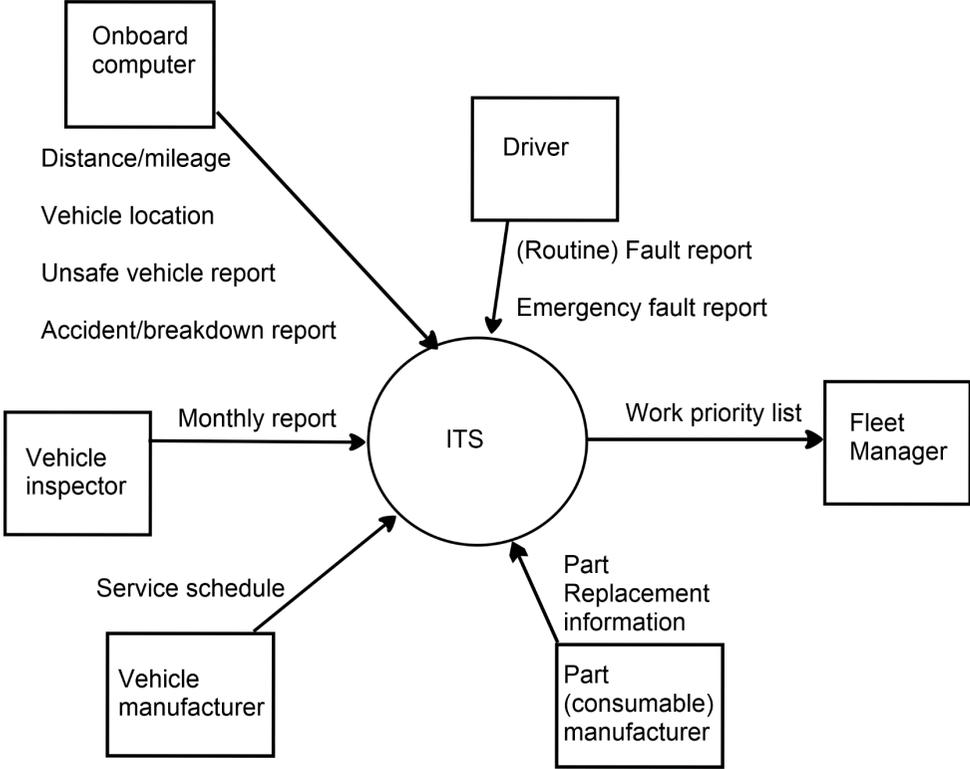
Question number	Answer	Additional guidance	Mark
1 e (i)	Award one mark for any of: <ul style="list-style-type: none"> • a passenger may not speak/know/understand/read the language of that country (1) • a passenger may be hearing/speech impaired and unable to communicate verbally (1) • practical example e.g. to read signs, tickets, documents (1) 		1
1 e (ii)	Award one mark for any of: <ul style="list-style-type: none"> • no need to employ staff who know (numerous) other languages (1) • better public relations/customer satisfaction (1) • can add new languages without adding staff (1) 		1
1 e (iii)	Award one mark for any of: <ul style="list-style-type: none"> • typos/keyboard errors may cause problems/mistranslation (1) • system may produce poor/unclear translation (1) • visually impaired/illiterate people may not be able to use it (1) 		1
Total for question 1			17

Question number	Answer	Additional guidance	Mark												
2 (a)	<p>Award one mark for each correctly completed cell in the table up to a maximum of four marks.</p> <table border="1"> <thead> <tr> <th colspan="2"></th> </tr> <tr> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>M</td> <td> Success can be measured by: <ul style="list-style-type: none"> • completing the training (successfully) • making the application on time/before completing university • gaining the promotion. </td> </tr> <tr> <td>A</td> <td>The objective is achievable if Tania can complete the training.</td> </tr> <tr> <td>R</td> <td> The objective is relevant because Tania wants to become a senior manager and the assistant manager post would be the first step on the promotion ladder. OR realistic as a university student should be able to complete first stage management training. </td> </tr> <tr> <td>T</td> <td>The objective is time-bound because Tania has set limits of six months for the training/end of course for the application.</td> </tr> </tbody> </table>					M	Success can be measured by: <ul style="list-style-type: none"> • completing the training (successfully) • making the application on time/before completing university • gaining the promotion. 	A	The objective is achievable if Tania can complete the training.	R	The objective is relevant because Tania wants to become a senior manager and the assistant manager post would be the first step on the promotion ladder. OR realistic as a university student should be able to complete first stage management training.	T	The objective is time-bound because Tania has set limits of six months for the training/end of course for the application.		4
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Question number	Indicative content		Mark
2 (b)	<p>Answers should be about characteristics of successful IT projects.</p> <p>Relationships with stakeholders:</p> <ul style="list-style-type: none"> • shared vision • accurate estimations • allowance for contingencies <p>Strong project management:</p> <ul style="list-style-type: none"> • ensuring sufficient resources • clear change management processing <p>Good documentation:</p> <ul style="list-style-type: none"> • of all processes • so that audits are possible • team changes are easier <p>Good communication:</p> <ul style="list-style-type: none"> • maintaining good relationships • looking at/fixing problems early • keeping everyone informed of progress/intentions/changes <p>On completion:</p> <ul style="list-style-type: none"> • fulfil requirements • meet the success criteria • are delivered within budget • complete on time • satisfy stakeholders 		6
Level	Mark	Descriptor	
	0	No rewardable material.	
Level 1	1-2	<ul style="list-style-type: none"> • Demonstrates limited knowledge and understanding, some of which may be inaccurate. • Applies understanding with limited coherence to produce a superficial and unbalanced discussion. 	
Level 2	3-4	<ul style="list-style-type: none"> • Demonstrates knowledge and understanding which is mostly relevant but may include some inaccuracies. • Applies understanding to make some coherent connections, leading to a discussion that shows some development, but may be unbalanced. 	
Level 3	5-6	<ul style="list-style-type: none"> • Demonstrates accurate and relevant knowledge and understanding throughout. • Applies understanding coherently to produce a balanced and fully developed discussion. 	
Total for question 2. 10			

Question number	Indicative content			Mark
3 (b)	<p>Answers should be about the impact of IoT (entertainment system and management chip) on the owner of the car.</p> <p>Positive aspects:</p> <ul style="list-style-type: none"> • Entertainment system <ul style="list-style-type: none"> ◦ very large number of playlists/media files available ◦ no need to sort/process media on other devices ◦ can stream material so reducing storage requirements. • Engine management chip <ul style="list-style-type: none"> ◦ performance data can be analysed 'live' to detect problems ◦ cloud/external analysis can be better/more comprehensive than onboard processing could manage ◦ updates/patches do not/may not require a visit to a garage/dealer. <p>Negative aspects:</p> <ul style="list-style-type: none"> • Entertainment system <ul style="list-style-type: none"> ◦ security of media files/personal accounts may be an issue ◦ external connection means the system could be hacked/compromised ◦ compromise of one system in the car could allow a hacker to get at more sensitive systems. • Engine management chip <ul style="list-style-type: none"> ◦ updates/patches may cause downgrade in performance/'brick' the chip ◦ security of the chip may be an issue ◦ unauthorised access to the chip could allow an external agent to take control of the car 			6
Level	Mark	Descriptor		
	0	No rewardable material.		
Level 1	1-2	<ul style="list-style-type: none"> • Demonstrates limited knowledge and understanding, some of which may be inaccurate. • Applies understanding with limited coherence to produce a superficial and unbalanced discussion. 		
Level 2	3-4	<ul style="list-style-type: none"> • Demonstrates knowledge and understanding which is mostly relevant but may include some inaccuracies. • Applies understanding to make some coherent connections, leading to a discussion that shows some development, but may be unbalanced. 		
Level 3	5-6	<ul style="list-style-type: none"> • Demonstrates accurate and relevant knowledge and understanding throughout. • Applies understanding coherently to produce a balanced and fully developed discussion. 		

Question number	Answer	Additional guidance	Mark
3(c)	<p>Award up to three marks for a linked description that includes:</p> <ul style="list-style-type: none"> • Information source(s) (1) • Relevant display (1) • Added information (1) <p>Answers may include:</p> <ul style="list-style-type: none"> • camera(s) on exterior of car (1) • proximity/distance sensors on outside of car/beside cameras (1) • camera(s)/sensors feed to a display inside the car (1) • display is placed so that driver's view aligns eye-display-camera viewpoint (1) • display shows exterior of car that is behind the display (1) • system provides guides/distance indicator on display (1) 	Allow 1 mark for a description of augmented reality that is not in context	3
Total for question 3. 15			

Question number	Answer	Additional guidance	Mark
4 (a)	<p>The diagram is an example of what the candidates might produce. Other layouts and content are acceptable. There are no specified symbols for an information flow diagram, allow anything consistent.</p> <p>Award one mark for each point to a maximum of nine marks.</p> <ul style="list-style-type: none"> • All components present (1) (Vehicle and part manufacturers may be combined) • All lines have correct directional arrows (1) • ITS sends work priority list to Fleet Manager (1) • Computer sends mileage and location details to ITS (1) • Computer sends accident/breakdown details to ITS (1) • Computer sends unsafe vehicle report to ITS (1) • Driver sends unsafe vehicle report/emergency fault report to ITS (1) • Vehicle inspector sends fault report to ITS (1) • Vehicle manufacturer sends service schedule to ITS. (May be via Fleet manager) (1) • Parts/vehicle manufacturer sends replacement schedule to ITS. (May be via Fleet manager) (1)  <pre> graph TD Onboard[Onboard computer] -- "Distance/mileage Vehicle location Unsafe vehicle report Accident/breakdown report" --> ITS((ITS)) Driver[Driver] -- "(Routine) Fault report Emergency fault report" --> ITS Inspector[Vehicle inspector] -- "Monthly report" --> ITS Manufacturer[Vehicle manufacturer] -- "Service schedule" --> ITS PartMfg[Part (consumable) manufacturer] -- "Part Replacement information" --> ITS ITS -- "Work priority list" --> Fleet[Fleet Manager] </pre>	Accept sensible alternative labels and information items	9

Question number	Indicative content		Mark
4 (b)	<p>Answers should be about information needed for organising deliveries.</p> <p>Size of each delivery to determine:</p> <ul style="list-style-type: none"> • optimum use of vehicle(s) • how packages/deliveries will fit in the vehicle • which vehicle(s) to use <p>Delivery locations:</p> <ul style="list-style-type: none"> • so that times/distances can be calculated • so that order of delivery can be decided/optimised • to arrange similar hours of driving/use for each driver/vehicle <p>Driver hours/rest periods so that:</p> <ul style="list-style-type: none"> • legal limits are not exceeded • available working hours are not exceeded • drivers have a full day scheduled but won't go into overtime <p>Opening hours at destination:</p> <ul style="list-style-type: none"> • so that deliveries are not made to closed locations • to allow delivery time slots to be booked • to ensure that unloading can be completed in time. <p>Specialist vehicle requirements:</p> <ul style="list-style-type: none"> • refrigeration needed • constraints on size of vehicle that can access a delivery site • constraints on size of vehicle on route, low bridge, weight limits, etc. <p>External factors:</p> <ul style="list-style-type: none"> • roadworks • peak traffic conditions. 		6

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	<ul style="list-style-type: none"> • Demonstrates limited knowledge and understanding, some of which may be inaccurate. • Applies understanding with limited coherence to produce a superficial and unbalanced discussion.
Level 2	3-4	<ul style="list-style-type: none"> • Demonstrates knowledge and understanding which is mostly relevant but may include some inaccuracies. • Applies understanding to make some coherent connections, leading to a discussion that shows some development, but may be unbalanced.
Level 3	5-6	<ul style="list-style-type: none"> • Demonstrates accurate and relevant knowledge and understanding throughout. • Applies understanding coherently to produce a balanced and fully developed discussion.
		Total for question 4. 15

Question number	Answer	Additional guidance	Mark												
5(a)	<p>Award one mark for:</p> <ul style="list-style-type: none"> • Model table • Model_colour table • Company table • Colour table • Indication of primary keys (Model, Company) • Indication of primary key (Colour) • Indication of foreign key (Company_ID in Model) • Indication of composite key in Model_colour • Fully normalised. <p>Model</p> <table border="1"> <tr> <td><u>Model_ID</u></td> <td>Model_name</td> <td>Company_ID *</td> <td>Order_time</td> </tr> </table> <p>Model_colour</p> <table border="1"> <tr> <td><u>Model_ID*</u></td> <td><u>Colour_ID*</u></td> </tr> </table> <p>Company</p> <table border="1"> <tr> <td><u>Company_ID</u></td> <td>Company_name</td> <td>Telephone</td> <td>Email</td> </tr> </table> <p>Colour</p> <table border="1"> <tr> <td><u>Colour_ID</u></td> <td>Colour_name</td> </tr> </table> <p>Alternative answer using parenthical format Model(<u>Model_ID</u>, Model_Name, Company_ID*, Order_time) Model_colour(<u>Model_ID</u>, Colour_ID) Company(<u>Company_ID</u>, Company_name, Telephone, Email) Colour(<u>Colour_ID</u>, Colour_name)</p>	<u>Model_ID</u>	Model_name	Company_ID *	Order_time	<u>Model_ID*</u>	<u>Colour_ID*</u>	<u>Company_ID</u>	Company_name	Telephone	Email	<u>Colour_ID</u>	Colour_name		9
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<u>Model_ID*</u>	<u>Colour_ID*</u>														
<u>Company_ID</u>	Company_name	Telephone	Email												
<u>Colour_ID</u>	Colour_name														

Question number	Answer		Mark
5 (b)	<p>Award up to two marks for a linked description.</p> <p>Answers may include:</p> <ul style="list-style-type: none"> • password/account limitations/permissions/rules/encryption (1) to allow access to (specified) data items (1) • password/account limitations/permissions/rules/encryption (1) to control which operations are allowed for a (specified) person/account (1) • usage monitoring/auditing (1) to track who is using the database/what people are doing with the database (1) 		2
Total for question 5.			11
Question number	Indicative content	Mark	
6	<p>Responses must be in the context of using an expert system with a chatbot to diagnose hardware problems</p> <p>How the expert system might work</p> <p>One possible method, other ways could be used, accept anything sensible that would allow:</p> <ul style="list-style-type: none"> • customer/chatbot interaction • a way of moving through a script/algorithm/flowchart • advice to be given to the customer • allow a live agent to intervene. • Chatbot follows a script. • collects common/starting data for all cases e.g. customer name, hardware item model, ID code, date of purchase/warranty. • based on starting data, script branches to e.g. specific hardware model questions. • the expert system may use a database of problems and solutions, which can be added to by the system. • Chatbot asks questions to identify problem. • Chatbot/expert system tries to pick relevant words/phrases out of customer answer to branch to the next question. • expert system may give Chatbot/customer steps to fix the problem. 	12	

- Chatbot/expert system must recognise when chat reaches a dead end/no answer available, to switch in a live agent.

Advantages and disadvantages

Advantages for customer.

- Less likely to have to wait for a service agent.
- System is more likely to have the latest/best information.
- System is less likely to give incorrect/mistaken information.

Advantages for company.

- May be cheaper over time, cost to create system less than running cost/wages for current system.
- Need less staff/staff training.
- Can serve more customers at once, customer satisfaction
- Can gather structured information about hardware problems more easily/automatically.

Disadvantages for customer.

- May be difficult to contact a real person
- System may go round in circles/keep restarting question sequence
- Frustration with dealing with a chatbot.

Disadvantages for company.

- May annoy customers, cause complaints, cause poor reviews, give wrong information
- May not deliver cost savings if too many cases have to go to a live agent
- Each new product would need extra development of the expert system, which could become unwieldy/too complex over time

Conclusion

There is no preferred option. Conclusions should be supported by arguments made in the answer.

The fact that a number of hardware manufacturers/vendors use a chatbot would indicate that a good business case for the new system exists in some situations.

The fact that not all manufactures/vendors use such a system would indicate that it is not always appropriate/successful.

Where a chatbot is used there is often an alternative help method such as email or a web form.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-4	<ul style="list-style-type: none"> • Demonstrates limited knowledge and understanding, some of which may be inaccurate. • Applies understanding with limited coherence to produce a response that lacks development. • Demonstrates limited awareness of competing arguments. • Conclusion, if present, is generic or unsupported.
Level 2	5-8	<ul style="list-style-type: none"> • Demonstrates knowledge and understanding, which is mostly relevant and may include some inaccuracies. • Applies understanding to make some coherent connections and a partially developed response. • Demonstrates some awareness of competing arguments, but this may be unbalanced, and partially supports conclusion with evidence.
Level 3	9-12	<ul style="list-style-type: none"> • Demonstrates accurate and relevant knowledge and understanding throughout. • Applies understanding coherently to produce a fully developed response. • Demonstrates an awareness of competing arguments and supports conclusion with evidence.
Total for question 6		12