Pearson Edexcel

Mark Scheme (Results)

October 2020

Pearson Edexcel International Advanced Subsidiary

In Information Technology (WIT13/01) Unit 3

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Unit 3 2006 – Mark Scheme

Question number	Answer	Additional guidance	Mark
1 (a) (i)	Award **one** mark each for any of the following for a maximum of **two** marks. • Saves on cost of hardware/servers (1) • Saves on cost of physical space/buildings (1) • Saves on cost of management/administration/maintenance of the servers (1) • Saves on cost of power (1) • Saves on cost of security measures (1)		**2**
1 (a) (ii)	Award **one** mark each for any of the following for a maximum of **two** marks. • Saving on bandwidth/storage space/physical space / Resource optimisation for the company (1) • Flexible deployment/improved disaster recovery/reconfiguration on-the-fly / Maximising uptime of the websites (1) • Moving a website to better/different hardware/better location / allowing hardware maintenance / Flexibility/workload migration (1) • New websites and servers can easily be set up and removed by automatic systems / Scaling and automation (1) • More robust/resilient / if one site is overloaded the others will be unaffected/a new server with more capacity can be produced (1) • More secure/resistant to malware / one site being affected by malware should not affect the others/it can be shut down and a new server produced (1)	Do not allow economic reasons	**2**

Question number	Answer	Additional guidance	Mark
1 (b)	Award **one** mark each for any of the following for a maximum of **three** marks. • VMs use a hypervisor/containers have a container manager (1) • VMs run on hardware/are given a share of hardware resources/containers run in virtual memory (1) • VMs have one OS per VM/containers use one OS to run multiple containers (1) • VMs use more resources/storage/disk space than containers (1) • VMs are (usually) larger/use more storage space than containers (1) • VMs take longer to start up/is slower than containers (1) • VMs are more secure than containers (1)		**3**

Question number	Answer	Additional guidance	Mark
1 (c)	Award up to **four** marks for a linked explanation. Answers may include: Flexibility: • Storage space/bandwidth can be rapidly altered/enlarged/reduced to allow for changing needs (of the website) (1) • Owners can select appropriate bandwidth/storage space (1) • Network attached storage can be switched in and out as needed (1) • Data can be split over several locations (1) • Portability/access from anywhere (1) Security: • Cloud service will (probably) provide a secure encryption system (1) • A named example of one encryption / require a key for access (1) • Data will be isolated from other people's data (1) • The cloud service will be running a commercial antimalware system (1) • The cloud service will run a commercial back-up system (1) (1) • Better physical security (1) • More resilience (1)		**4**
		Total for Question 1	**11**

Question number	Answer	Additional guidance	Mark
2 (a)	Award up to **two** marks for each of **two** linked descriptions. Answers may include: • Sales / marketing (1) e.g. handling loyalty schemes / looking for trends / tracking seasonal variations (1) • Inventory control (1) e.g. reports on levels in shops and distribution centres / improving throughput/reducing storage times / ensuring timely deliveries (1) • Management reporting (1) e.g. producing timely/on demand/tailored reports for e.g. inventories/trends/personnel/other reasonable management function (1) • Personnel/human resources (1) e.g. managing/planning recruitment/training requirements / managing employee welfare/safety/legal compliance issues (1) • MIS feeding into decision support and/or executive information systems (1) e.g. running what-if? scenarios/projections (1) Example: • The MIS will enable the company to compile/analyse customer data (1) to learn more about customers' purchasing habits / enabling it to run effective targeted marketing campaigns (1) Structure: • Performing action related to MIS (1) in order to do something for the business (1)	Do **not** accept answers about financial matters. Record keeping, decision making, project management are not sufficient by themselves. Answers must be in context.	**4**

Question number	Answer	Additional guidance	Mark
2 (b)	Award up to **two** marks for each of **two** linked descriptions. Answers may include: • use of telematics/remote monitoring/diagnostics (1) to monitor e.g. engine hours/wear / fuel level/consumption / other reasonable measurable value (1) • use of GPS system/trackers (1) to monitor e.g. driving behaviour / vehicle location / unauthorised use of vehicles (1) • to monitor driving behaviour (1) to reduce the risk of accidents / to encourage drivers to adopt safe driving practices (1) • use of driver assistance tools/systems (1) e.g. collision detection / real time traffic information/route warnings/changes to avoid hold-ups / blind spot warning/detection system to prevent accidents (1) • allocate deliveries to vehicles/route planning (1) to ensure efficient use of assets (1) Example: • Be able to monitor engine hours (1) in order to plan/schedule maintenance / so that parts can be replaced before they get worn out (1)	Students may not give the tool used.	**4**

Question number	Indicative content	Mark
2 (c)	Answers should be in the context of **benefits** to the company of the use of the TP system. The discussion may include: • cost savings on staff on tills / labelling prices on individual items • faster transaction speeds, resulting in serving more customers per unit time / greater customer satisfaction • better accuracy/less manual error, resulting in greater customer satisfaction • use of EPOS to assist in first three points • linked to automated stock control/better stock control, resulting in improved logistics / better use of space / improved ordering times / reduction of waste • automated reporting of individual and aggregate shop data to HQ, resulting in improved logistics / better management decisions / relevant management task • tracking of customer data between shops / allows a chain-wide customer database • provide insight into customers' buying habits/preferences for purposes of target marketing • monitor staff performance on the tills / throughput on the tills • integrate third party payment systems such as credit cards	**6**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• 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	• 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	• Demonstrates accurate and relevant knowledge and understanding throughout. • Applies understanding coherently to produce a balanced and fully developed discussion.
		Total for Question 2 | **14**

Question number	Indicative content	Mark

3	Responses must be in the context of a coffee machine as part of the Internet of Things (IoT)
	
	Impact on individuals (the owner):
	
	• privacy issues, limited, probably no personal data being moved
	• household security issues:
	  o pattern of operation could reveal when house is unoccupied
	  o machine could be made to operate when house is unoccupied/at unusual hours
	  o machine could be made to cycle continuously, wasting power/supplies
	  o machine could be used as an access point to the home network, allowing injection of malware / unauthorised access
	• financial issues, ordering supplies implies financial transactions which could be intercepted leading to:
	  o theft of financial data such as bank details, payment login and transaction details
	  o ability of attacker to make/cancel payments/orders
	  o ability of attacker to reroute payments/orders
	• owner confidence issues:
	  o performance of the machine affects confidence in other IoT devices and vice versa
	
	Impact on organisations (the company, payment companies, supply companies):
	
	• privacy issues:
	  o coffee machine company, limited, probably no personal data being moved but may still have to register with data commissioner or equivalent
	  o payment and supply companies, must ensure payment/personal data is secure uses SSL/https even if the originating message is in plain text/http
	• financial issues:
	  o payment and supply companies may be left out of pocket if bogus transactions are allowed
	  o companies may be held liable for intercepted transactions, even if they are not the originator
	  o bogus payments, etc. would lead to loss of commercial confidence by consumers and other financial companies, causing loss of business and/or higher costs
		12

Impact on data (data sent to and from the machine):

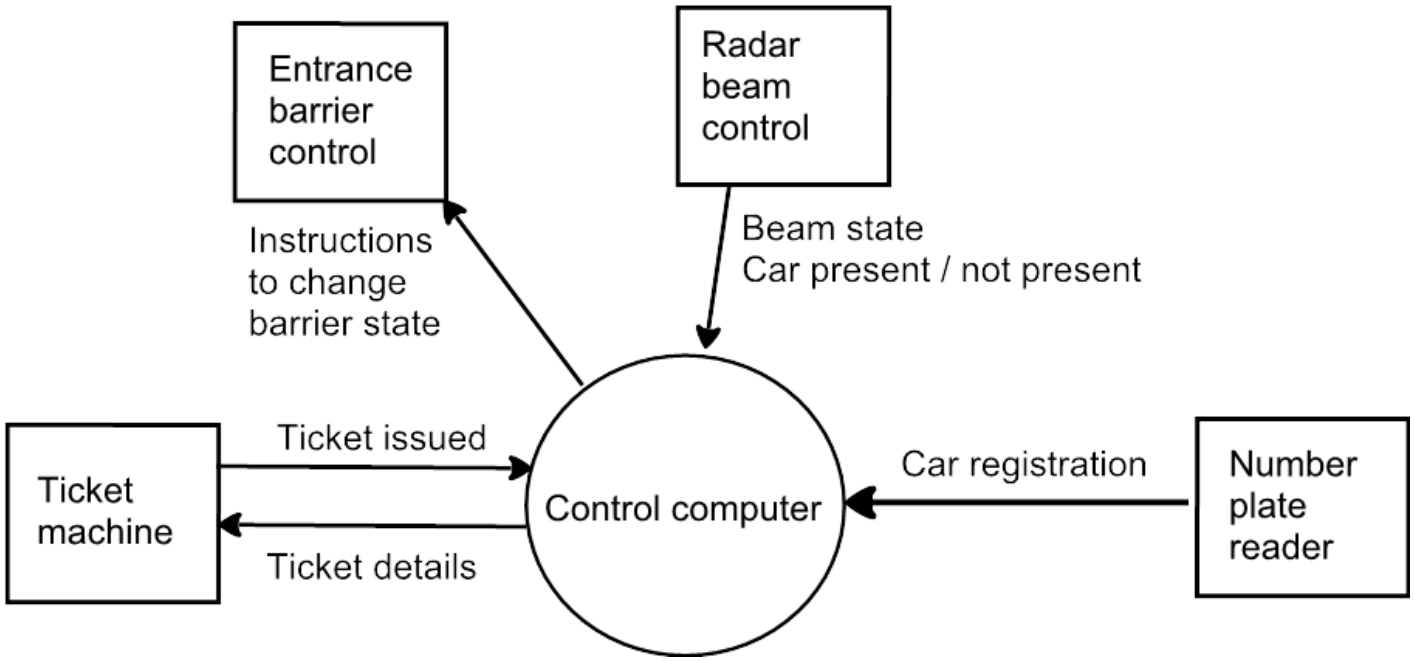
- if data can be read by an attacker then it can be altered or corrupted this could enable attackers to:
  - alter operating parameters such as temperature, amounts of coffee per cup
  - report false faults or suppress real ones
  - send or suppress alerts
  - change or suppress orders for supplies
  - machines could be turned into part of a botnet for e.g. spam or virus distribution / DDOS attack / cryptocurrency mining

Possible / plausible security methods

- encryption of the WiFi link, e.g. use WPA2
- end to end encryption of link from machine to company and/or the app, (**note**, this is not SSL/https and is **not** viable for other links)
- strong authentication/two factor authentication on ordering/payments link
- ensure ordering/payments sites are approved and use SSL/https
- strong password/authentication/two factor authentication for log in/connection from app to machine
- require owner authentication of order/payment type transactions
- ensure each machine ships with a unique password / enforces a password change/activation when first used
- employ penetration/security testers to look for exploits before production / offer a bounty for exploits found, and reported, after production
- perform timely (firmware) upgrades if a security flaw is found

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–4	• 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	• 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	• 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 3	**12**

Question number	Answer	Additional guidance	Mark
4(a)	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. Award **one** mark for each point to a maximum of **six** marks. • All components present and connected by lines (1) • Number plate reader sends registration to computer (1) • Computer sends ticket details (registration and time) to ticket machine (1) • Ticket machine sends ticket issued/taken information to computer (1) • Computer sends instructions to move barrier used at entrance (1) • Radar beam controller sends beam state to computer (1)  	Accept sensible alternative labels and information items	**6**

Question number	Indicative content	Mark
4(b)	Answers should be in the context of changeover from a **manual** to an **automated** car parking system using the **pilot** method. Benefits • New system installed in one car park only, so cheaper/easier to implement • Allows system to be altered/improved before roll-out to other car parks • Contains disruption to a single car park rather than the whole company • Limits financial burden in case of failure • Staff training for other car parks can be carried out after the pilot study when the problems/requirements are clearer Drawbacks • Company would need to check results against other similar car parks, this takes time/money/personnel • Would need data from previous periods. e.g. running cost, profit, number of cars served, queueing times, customer satisfaction/complaints, this takes time/money/personnel • Risk of car park closing due to system failure, thus losing money, goodwill • Takes longer to implement the change than some other/named changeover methods	**6**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• 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	• 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	• Demonstrates accurate and relevant knowledge and understanding throughout. • Applies understanding coherently to produce a balanced and fully developed discussion.
		Total for Question 4 **12**

Question number	Answer	Additional guidance	Mark
5(a)	Award **one** mark for each point up to a maximum of **three** marks for a linked explanation. Differences: • Location. Passive are held externally to the database, active are part of the database • Referencing. Passive are not looked at during database operations, active are checked by the DBMS during use of the database • Maintenance/updating. Passive are maintained/updated manually/at intervals/by an external system, active are maintained/updated (automatically)/in real time by the DBMS/database system Consequences: • Passive do not have guaranteed consistency/may not agree with the database, active will be consistent • Passive cannot exercise control over the database, active have a direct effect during use Example: • Active data dictionary is contained within the database, whereas a passive data dictionary is maintained separately (1). Active data dictionary is automatically updated where the change is made, whereas a passive data dictionary is not updated in real time (1). This means that the passive dictionary is not always consistent with the database, whereas the active dictionary is (1). Structure: • **One** mark for each of **two** differences, **one** mark for a consequence of a difference.		**3**

<table>
<tr>
<td>5(b)</td>
<td>Award up to two marks for each of two linked descriptions, such as:

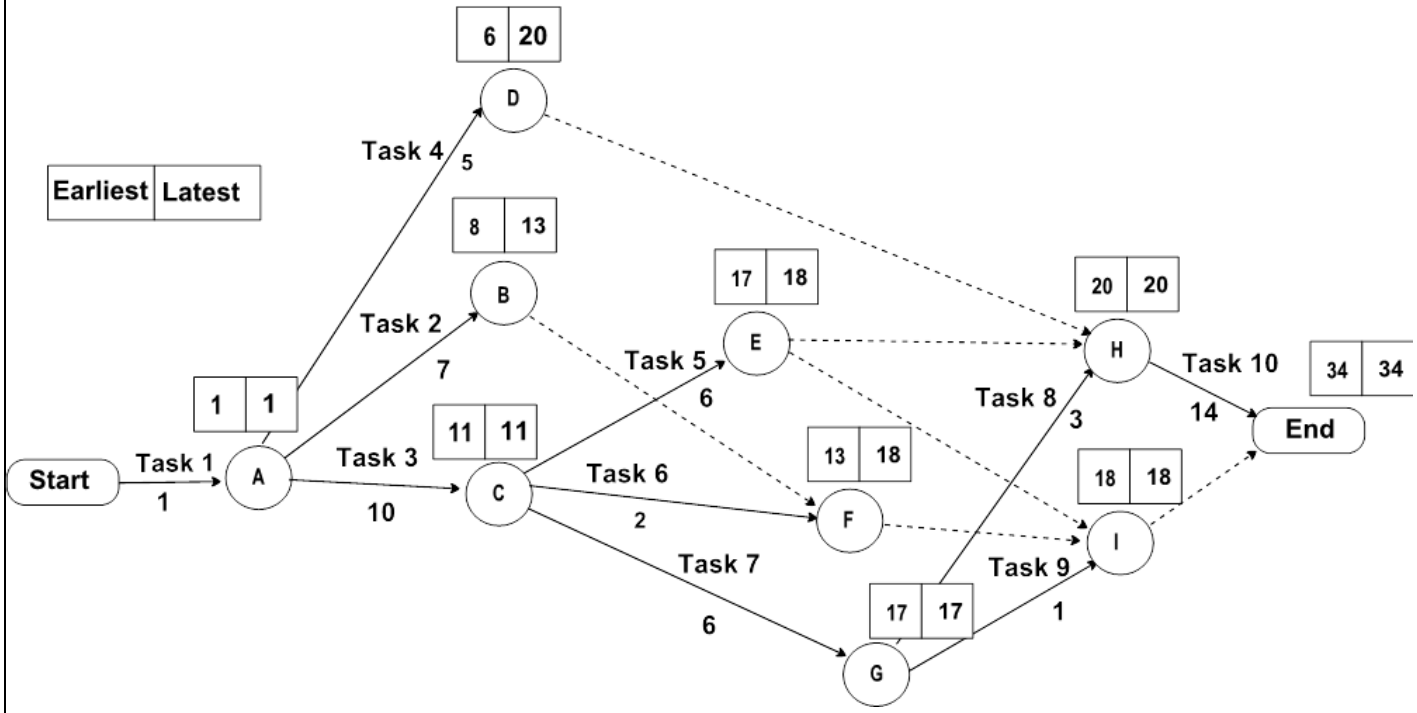
• provides (management) reports (1) on the data and resources being used (by objects) (1)
• uses access rights (1) to control access to schema/views (1)
• communicates a common meaning for all the elements in a database (1) to help users understand the database/reduce errors/help with standardisation of tasks (1)
• audits who has made what changes (1) to assist with security/database maintenance (1)
• enables application developers to create forms/reports with correct data types/controls (1) to help with reliability/improve productivity (1)</td>
<td>Do not accept answers about metadata</td>
<td>4</td>
</tr>
<tr>
<td>5(c)</td>
<td>The table is an example of what the candidates might produce. Other content is acceptable.

Award one mark for each point to a maximum of nine marks.
• Table names use an appropriate convention (1)
• All attributes/fields are present in a recognisable form and with the correct table (1)
• All data types are appropriate (1)
• Both primary keys are shown (1)
• Contact ID is shown as a foreign key in the address table (1)
• All compulsory/required fields are indicated (Contact ID, First name, Last name, Telephone, Address ID, Address type, Address line 1, Postcode) (1)
• All text field lengths are appropriate (1) (INT fields do not need a length.)
• DoB format is correct (1) (Allow any sensible variation on DD MM YYYY)
• DoB field size is 10 (1) (allow 8 if it fits format or no format shown)
• DoB field has a workable validation for age over 18 years (1)
• Marital status is shown as a list/lookup with sensible values (1)

<table>
<tr><td>Table name</td><td colspan="4">Tbl_Contact</td><td rowspan="2">Description / notes</td></tr>
<tr><td>Attribute / field name</td><td>Data type</td><td>Key (P/F)</td><td>Reqd (Y/N)</td><td>Field size</td></tr>
<tr><td>Contact_ID</td><td>int or text</td><td>PK</td><td>Y</td><td>-6</td><td></td></tr>
<tr><td>First_name</td><td>text</td><td></td><td>Y</td><td>50</td><td></td></tr>
<tr><td>Last_name</td><td>text</td><td></td><td>Y</td><td>50</td><td></td></tr>
</table>
</td>
<td>Data types could also be e.g.: VARCHAR if field content length is variable.
CHAR if length is fixed.
NUMERIC or NUMBER instead of int.
STRING instead of text.

Accept any understandable and consistent naming conventions.</td>
<td>9</td>
</tr>
</table>

	DoB	date		N	10 / format	display as DD/MM/YYYY Validate < Today - 18 years		
	Marital_status	text		N	8	list; Married, Single, Divorced, Widowed		
	Telephone	text		Y	12			
	Employer	text		N	50			
	Table name	Tbl_Address						
	Address_ID	int or text	PK	Y	-6			
	Contact_ID	int or text	FK	Y	-6			
	Address_Type	text		Y	5			
	Address_L1	text		Y	50			
	Address_L2	text		N	50			
	Town	text		N	25			
	Postcode	text		Y	10			
						Total for Question 5		**16**

Question number	Answer	Additional guidance	Mark
6(a)	The diagram is an example of what the candidates might produce. Other layouts and content are acceptable if they conform with the marking points. Award **one** mark for each point to a maximum of **nine** marks. • At least five nodes identifiable (1) • At least five lines shown have correct arrows (1) • At least four tasks are identifiable (names or numbers) and have the correct duration (1) • At least seven tasks are identifiable (1) • Two dependencies clearly marked (1) • All nodes use consistent notation with an ID and early/late times • Four correct sets of early / late times (1) • Three further correct sets of early / late times ~~(total of ten)~~(1) • Critical path clearly identified (Tasks 1, 3, 7, 8, 10) (1) Does not have to be correct  	Any sensible and consistent symbols may be used for the diagram	**9**

Question number	Indicative content		Mark
6(b)	Answers should be in the context of **Shehani** using critical path analysis for the project. Using CPA requires Shehani to do detailed planning which: • helps her understand the project/importance of each task • lets her see / identify dependencies so she can order tasks • reduces delays • lets her allocate resources needed for each task at the appropriate time, reducing costs • lets her see slack time and bottlenecks CPA will not always give the best answer because: • complex tasks may be difficult to represent on the diagram • external factors may change • it relies on time estimates for each task which may be inaccurate Shehani is a novice with CPA which means: • the precedence list is not properly completed • she may make other mistakes when creating the diagram • she may not be able to spot errors in time to adjust the project • even a simple error could cause her to miss the deadline		**6**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• 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	• 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	• Demonstrates accurate and relevant knowledge and understanding throughout. • Applies understanding coherently to produce a balanced and fully developed discussion.
		Total for Question 6 | **15**

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