Mark Scheme (Results)

Summer 2024

Pearson Edexcel International Advanced Level in Information Technology (WIT13/01)
Unit 3

Question number	Answer	Additional guidance	Mark
1(a)(i)	Award up to **two** marks for a linked explanation such as: • It reduces the need to install/buy/upgrade/use local secondary storage (1) because no data is stored locally / all data is stored on remote servers (1) • It can be accessed from multiple devices/on the move (1) because it is accessible through an Internet connection (1) • It serves as backup media (1) because no data is stored locally / all data is stored on remote servers (1)	For both marks, the expansion must follow/associate with the statement. Do not award 'to the cloud' as an expansion as it is given in the question	**2**

Question number	Answer	Additional guidance	Mark
1(a)(ii)	Award up to **two** marks for a linked explanation such as: • You need login credentials/username and password/two-factor authentication (to the cloud server) (1) because they allow you to access the storage / because they are tied to a single account (1)	For both marks, the expansion must follow/associate with the statement. Do not award 'firewall' and 'encryption' as they are given in the question	**2**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>1(b)(i)</td><td>Award up to two marks for a linked explanation, such as:

• The date has valid/plausible numbers for day, month, and year/is in an acceptable/recognisable format (1), whereas the date may not be the true date of birth of the person entering it / the user may have entered a false date intentionally / the user may have confused the dd and mm when entering (1)</td><td>Valid is defined as fit for processing
Accuracy is defined as the correctness of the data</td><td>2</td></tr>
</table>

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>1(b)(ii)</td><td>Award one mark for each correct cell:

<table>
<tr><th>Input item</th><th>Validation required</th></tr>
<tr><td>Name</td><td>Length (1)

0 < length(name) <= 25 (1)</td></tr>
<tr><td>Password</td><td>Presence (1)</td></tr>
<tr><td>Programme of Study</td><td>List/lookup (1)</td></tr>
<tr><td>Subject</td><td>Lookup/list (1)</td></tr>
<tr><td>Credit Card Number</td><td>Check digit (1)</td></tr>
<tr><td>Postcode</td><td>Format (1)</td></tr>
</table>
</td><td>Allow range check on length for name, but must be clearly the length which is being checked, not just the name

Allow null check and not null for presence check on password field</td><td>6</td></tr>
</table>

Question number	Answer	Additional guidance	Mark
2(a)	Award **one** mark for each correct label: Haptic (1) Visual (1) Audio (1) Visual (1)	Accept senses such as sound, touch/feel, and sight.	**4**

Question number	Answer	Additional guidance	Mark
2(b)	Award up to **two** marks for a linked description such as: • An image of the correct hand placement (1) could be projected over the patient's chest (1) • An image of the correct oxygen mask placement (1) could be projected over the patient's face (1) • The effectiveness of chest compressions (1) could be shown by a holographic overlay of blood vessels/heart movements (1) • Data/information about the patient (1) could be shown on a heads-up display/helmet/visor (1)	For both marks, the expansion must follow/associate with the statement. Do not award modifications to the CPR dummy	**2**

Question number	Answer	Additional guidance	Mark
2(c)	Award **one** mark for any of the following up to a maximum of **two** marks: • Control/limit the set of software (1) • Software can be updated on all virtual machines at one time (1) • Software does not need to be updated to run on new operating systems (1) • Saves money/space because fewer physical machines are needed (1) • Virtual machines use less energy/cost less money to run (1) • The number of virtual machines can be increased as the number of technicians increases (1)	Do not award 'saves money' without a reason how	**2**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>2(d)</td><td>Award one mark for each correct cell:

<table>
<tr><th>Situation</th><th>Type of artificial intelligence</th></tr>
<tr><td>Technicians use voice-operated devices to give the location of an incident.</td><td>Natural language processing (1)</td></tr>
<tr><td>Technicians wear bodycams that record incidents. A computer program transcribes the audio to a text document before it is stored on a server.</td><td>Speech recognition (1)</td></tr>
<tr><td>Technicians supply the symptoms of a patient to a computer program. The program diagnoses a heart attack.</td><td>Expert system (1)</td></tr>
<tr><td>Technicians attend a conference at the end of their training. Transcripts of panel discussions are produced by a computer program.</td><td>Speech recognition (1)</td></tr>
<tr><td>Technicians input an image of a spider to a computer program. The program indicates that the spider is venomous.</td><td>Expert system (1)</td></tr>
<tr><td>Technicians use a computer program to communicate with patients who do not speak English.</td><td>Natural language processing (1)</td></tr>
</table></td><td>Speech recognition is transforming spoken word to text.

Natural Language Processing (NLP) is causing a word to be translated to an action.</td><td>6</td></tr>
</table>

Question number	Answer	Additional guidance	Mark
3(a)	Award **one** mark for any of the following, up to a maximum of **two** marks: • To ensure records/fields/tables are consistent across multiple locations (1) • To distribute the processing load across different servers / promote scalability (1) • To increase the chance that one instance of the database will always be available (1) • To ensure data is available close to the requester / reduce access times / reduce communications costs (1) • To provide multiple copies of data so if one node is corrupted others can still supply data (1)		**2**

Question number	Answer	Additional guidance	Mark
3(b)	Award up to **two** marks for a linked description such as: • A query will be run (1) that pulls information/fields from customer table and the order table (to create the delivery note) (1) • The driver's view (defined by a query) (1) that extracts the customer's name and address from the customer table, the order details from the order table (and adds the driver's name and ID, plus the current date) (1)	For both marks, the expansion must follow/associate with the statement.	**2**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>3(c)</td><td>Award one mark for any of the following:

• empID/accidentFree must be integer data type (1)
• empID must be required and primary key (1)
• lastname must be a string with an appropriate size (15+) (1)
• phone must be a string with a size of 10 (1)
• Dob must be a date data type (1)
• drive must be a Boolean data type (1)

Example:

<table>
<tr><th>Name</th><th>Data type</th><th>Size</th><th>Required</th><th>Comment</th></tr>
<tr><td>empID</td><td>Integer</td><td></td><td>Yes</td><td>Primary key</td></tr>
<tr><td>lastName</td><td>String</td><td>15+</td><td>Yes</td><td></td></tr>
<tr><td>phone</td><td>String</td><td>10</td><td></td><td></td></tr>
<tr><td>dob</td><td>Date</td><td></td><td></td><td></td></tr>
<tr><td>drive</td><td>Boolean</td><td></td><td></td><td></td></tr>
<tr><td>accidentFree</td><td>Integer</td><td></td><td></td><td></td></tr>
</table>
</td><td>Allow VARCHAR, if field length is variable; CHAR if length is fixed.

Allow NUMERIC/NUMBER instead of integer.

Allow TEXT instead of string.

Allow SMALLINT, BIGINT for numbers.

Allow DATETIME for DATE

Allow any number for lastName of 15+

Allow key/PK for Primary key</td><td>6</td></tr>
</table>

Question number	Answer	Additional guidance	Mark
4(a)	Award up **two** marks for a linked description such as: • A labelled dataset / dataset of applications and outcomes is used to train the algorithm (1), so that when an unseen application is analysed it is classified to one of the three cases (1) • Data about previous applications and outcomes is used to train the algorithm (1) (to identify success factors such as income and years of employment). It uses this knowledge to screen applications and select the appropriate outcome. (1)	For both marks, the expansion must follow/associate with the statement.	**2**

Question number	Indicative content	Additional guidance	Mark
4(b)	**Obtain** • Big Data is made up of datasets from various organisations, including corporations, research institutions, and governments. • The financial institution will either buy or license for use a variety of datasets from other sources. • The financial institution will have some datasets based on its own business. **Store** • Big Data is usually stored in the cloud, because the infrastructure to maintain huge amounts of storage can be prohibitive in terms of cost. • The volume of data being collected can also be large, thereby requiring infrastructure and personnel to manage it. • The velocity of data being collected also means that a mechanism may be needed to ensure it is up to date. **Use** • Descriptive (historical) analysis can be used to describe what has happened in the past, such as bad business decisions, market fluctuations, and fraud events.		**6**

	• Predictive analysis can be used to identify what might happen in the future. This could be trends away from using cash to using cards or a change in trends around products bought. • Prescriptive analytics could be used to inform business decisions around increasing or decreasing interest rates on accounts. • Analytics could use pattern analysis to find outliers or suspicious trends, that could inform decisions about fraud.		

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.

Example:

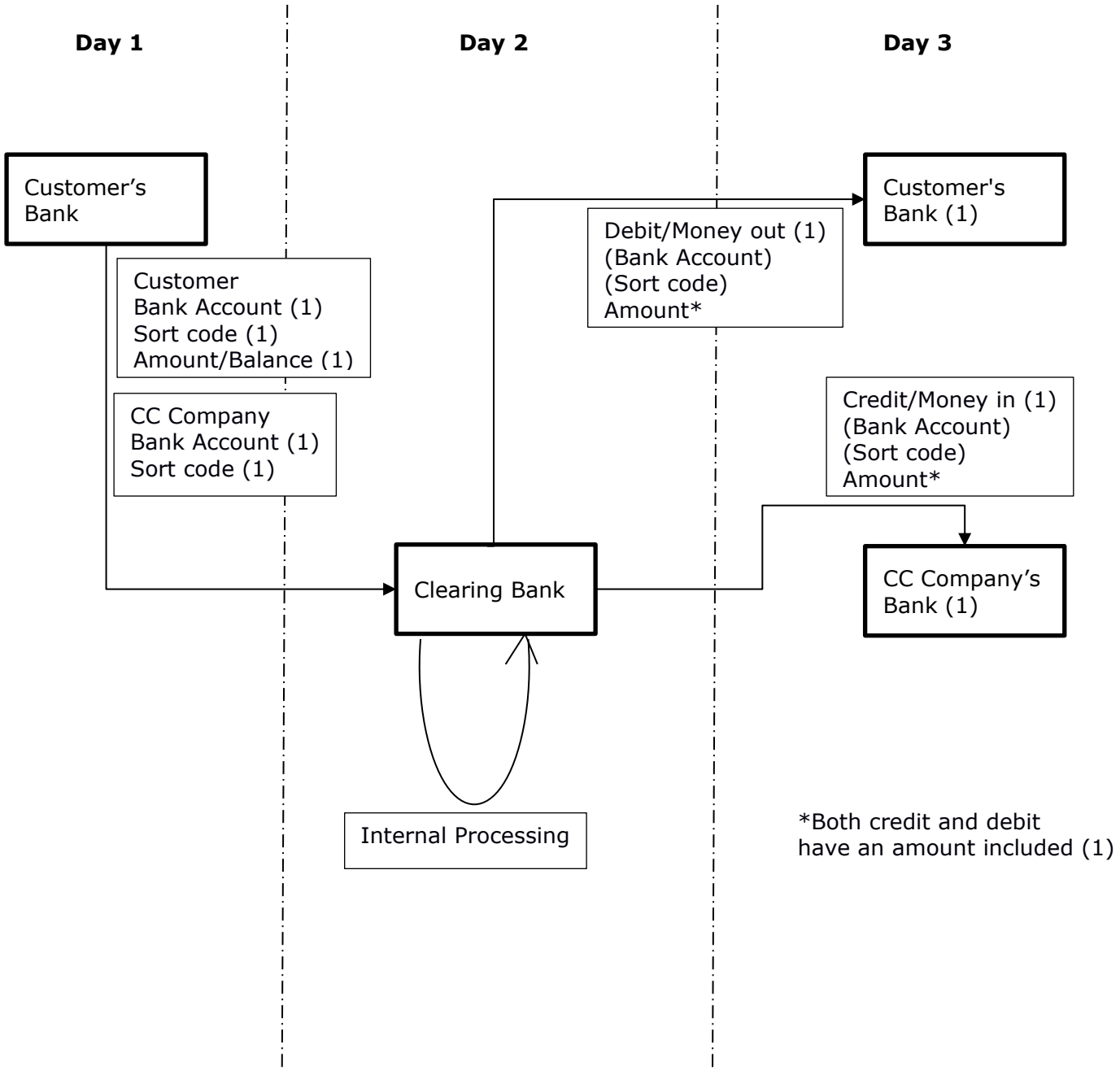
The financial institution could have data from its previous business and could add to this by buying datasets outright from other companies/organisations or by licensing use of such data. Some data may be freely available such as government (national and local) data.

Because of its size, Big Data is usually shared in the cloud. It would be too expensive to pay for local physical storage. Staff who are trained in maintaining large stores of data would be required, as data can fall out of date or be something which changes frequently so needing frequent updates.

Big Data can be useful in several ways to the financial institution: a range of factors and traits can be examined to gain understanding of past events and the effect of business decisions.

It can also be used with caution to predict the future results of proposed actions. It could be used to anticipate interest rate changes, drops/rises in foreign exchange, or shifts in customers' focus from savings to spending.

Question number	Answer	Additional guidance	Mark
4(c)	Award **one** mark for any of the following: Day one • Customer's bank account number / 12345678 (1) • Customer's bank sort code number / 12-34-56 (1) • Customer's requested amount / 456.12 (1) • CC Company's bank account number / 99875234 (1) • CC Company's sort code number / 17-18-19 (1) Day three • Customer' bank entity/box labelled (1) • CC Company's bank entity/box labelled (1) • Arrow from clearing banks to CC Company's bank, labelled as a credit (1) • Arrow from clearing banks to Customer's bank, labelled as a debit (1) • Both credit and debit have an amount / 456.12 included (1)	Ignore any extra items provided on any flow. Allow equivalent expression for credit/debit if positive/negative is clear. Allow numbers/text from the invoice if provided. Do not award unqualified items such as 'bank account' or 'sort code' without knowing if it is customer's or credit card company's	**10**


Day 1
Day 2
Day 3
Customer's Bank
Customer Bank Account (1) Sort code (1) Amount/Balance (1)
CC Company Bank Account (1) Sort code (1)
Clearing Bank
Internal Processing
Debit/Money out (1) (Bank Account) (Sort code) Amount*
Customer's Bank (1)
Credit/Money in (1) (Bank Account) (Sort code) Amount*
CC Company's Bank (1)
*Both credit and debit have an amount included (1)

Question number	Indicative content	Additional Guidance	Mark
5	Responses should be in the context of a college. **Record keeping** • Student/staff contact details will be kept in the MIS. • Employment status/shifts/pay records will be kept in the MIS. • Registration records for each class will be maintained/automatically updated in the system. • Details/author/type/price/location for each library resource can be kept in the MIS. • Records for each resource loan/return can be kept in the MIS. • Centralised MIS will speed up production of internal and external reports. • Collecting data and analysing data will be much quicker using an MIS. **Decision making** • In the event of an emergency, the details of the first aiders can be retrieved quickly. • Students showing poor attendance can be contacted to find out the reasons. • Students showing excellent attendance can be identified for rewards. • Missing library resources can be identified and decisions made about replacing them. • Centralised MIS will speed up production of internal and external reports. • Collecting data and analysing data will be much quicker using an MIS. **Project management** • Inventory reports can be run directly from the MIS, only requiring crosschecking with the physical item. • Stock items in the cafeteria can be automatically compared against the upcoming menus to reorder. • Part-time staff could be identified to work more hours for library inventory/delivery of stock/checking on students. • Centralised MIS will speed up production of internal and external reports. • Collecting data and analysing data will be much quicker using an MIS. **Issue of implementing an MIS** • Staff have to be trained to use the MIS. • Technicians will have to be trained in how to maintain/update the MIS. • New infrastructure/machines/networks/storage may need to be purchased to hold the MIS. • Disaster recovery plans, specific to the MIS, will need to be developed.	Award data protection/security only once	**12**

	• Data protection / security issues. • For an organisation of this size, it makes sense to digitise as much process management as possible. **Conclusion** • There is no **correct** conclusion. • Conclusion should be supported by arguments in the rest of the answer. • Conclusions do not have to be explicitly stated, but may be inferred from the argument.		

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.

Example:

The college could use the MIS to hold all the name/address/telephone details for all its staff and students. The staff employment records (terms of employment, role, pay and tax details) could also be held in the MIS. The registers for all the college classes can be managed by the MIS and will be updated automatically as they are completed in each class. Equipment or books/DVDs with are taken out by students or staff can be record on the MIS.

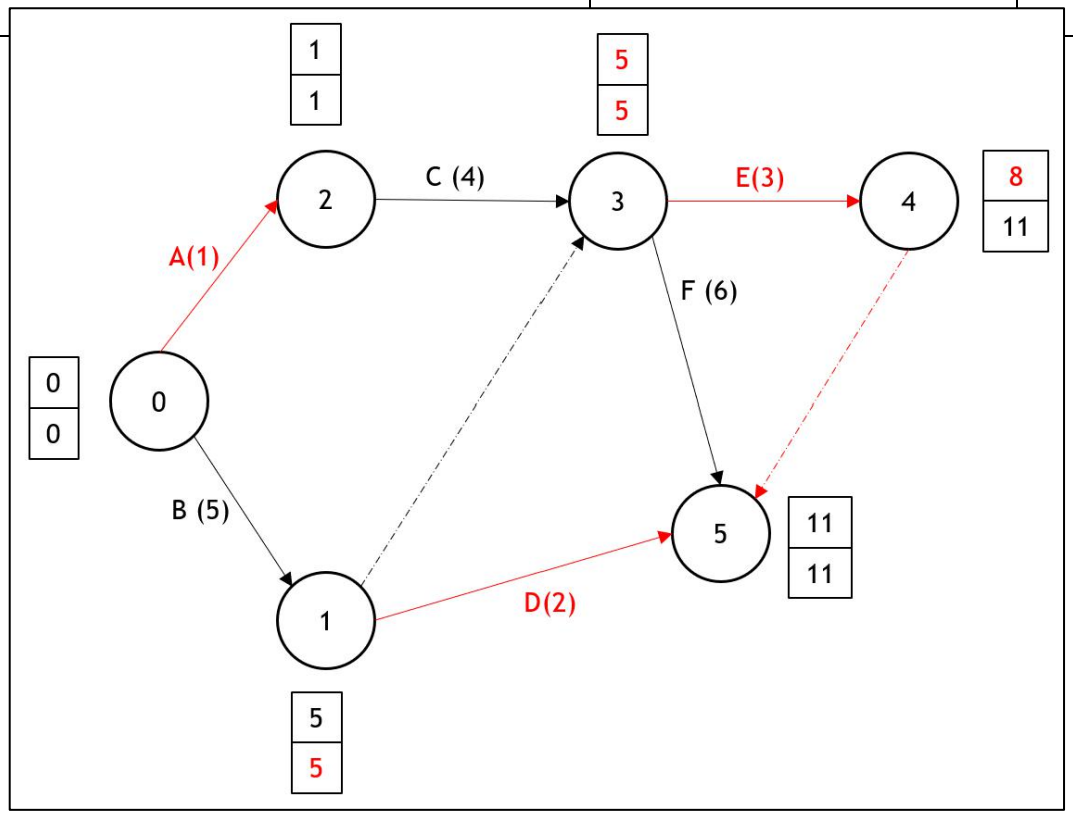
These areas will all benefit from the speed of the MIS in processing the data and producing reports e.g. of attendance below a specified percentage or the amount of resources out on loan or overdue for return. This would mean that poor attendance can be closely monitored and action can be taken before the problem gets any worse. The equipment and books can be followed up so that the state of resources is known. Particular groups of students, for example those from a specific area which had a major accident such as flooding or roads blocked due to accident can be identified quickly and decisions made about appropriate action. If resources are depleted, a decision whether to replace them can be made.

Stock check-ups of all resources can be speeded up by the MIS producing inventory lists for checking against the physical stock. This could be useful in all departments but particularly in chemistry and the cafeteria because of the large number of items they hold.

There will need to be proper training for members of staff to use the MIS and technical staff will need to be trained to maintain it. The MIS will have to be incorporated into the colleges overall planning for data protection and security, disaster recovery planning and backup procedures. It is likely that some hardware and extended network provision will be needed.

Although this will be a costly move, it should help the college to move efficiently and effectively into the future.

Question number	Answer	Additional guidance	Mark
6(a)	Award up to **two** marks for a linked description such as: • Accessing the QR code requires a network connection (1), which may not be secure/which may allow unauthorised/hackers access (to data on the network) (1) • If the software on the oven is not secure (1), the Wi-Fi connection it uses could be vulnerable to unauthorised access/allow hackers to access other data on the network (1) • The oven may have been despatched with a default/weak password (that the homeowner does not/cannot change) (1) allowing criminals access to data stored on other devices connected to the home network (1)	For both marks, the expansion must follow/associate with the statement. Must make connection to homeowner's network	**2**

Question number	Answer	Additional guidance	Mark
6(b)	Award up to **two** marks for a linked explanation such as: • The number of seeds lost in the wind/wasted will be reduced (1), because the farmer can identify the best days for planting seeds (1) • The seeds/plants have a better chance of survival (1), because the farmer can identify if the soil is too wet/too dry/too warm/too cool (1) • Harvests can be done when the crop is at its peak readiness (1) because the farmer can identify the correct air temperature/moisture levels (1)	For both marks, the expansion must follow/associate with the statement.	**2**

Question number	Answer	Additional guidance	Mark
6(c)	Award **one** mark for any of the following, up to a maximum of **ten** marks: **Precedence table** • Predecessor of F identified as B (1) • Predecessor of F identified as C (1) **Network diagram** • Arrow labelled A(1) connecting node 0 and node 2 (1) • Arrow labelled D(2) connecting node 1 and node 5 (1) • Arrow labelled E(3) connecting node 3 and node 4 (1) • Dummy arrow (dash line) added from node 4 to node 5 (1) • 8 in top box of node 4 (1) • 5 in bottom of node 1 (1) • 5 in top box of node 3 (1) • 5 in bottom box of node 3 (1)	Other notation is acceptable, such as arrows located mid-line rather than at end, but all lines must have notation for direction Do not award: • Addition of nodes • Multiple arrows between nodes • Solid line for dummy arrow • Dashed line for solid line	**10**