Unit 4: Exchanging Data
(4b. Databases, AS Content)

Marks: /35

Answer **all** the questions.

1. InterMovie is a service that allows users to stream movies over the Internet.

   InterMovie has a relational database of the films it offers. The database has the field *Film Title* which stores the name of a film (e.g. 'Aliens Attack').

   (i) Describe why *Film Title* is not a suitable primary key.

   ---[2]

   (ii) Describe why *Film Title* would make a suitable secondary key.

   ---[2]

2(a). Discuss the suitability of flat files and relational databases for use by a family at home and for use in a large mail order company.

The quality of written communication will be assessed in your answer to this question.

[8]

(b). In any relational database, primary keys and foreign keys are used.

(i) What is a primary key?

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[1]

(ii) Explain the use of a primary key as a foreign key.

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[3]

3(a). A company sells garden furniture. It has decided to create a relational database. A first, incomplete database design includes two tables PRODUCT and ORDER.

PRODUCT (ProductId, ProductType, Size, Price,…)
ORDER (OrderId, OrderDate, ProductId,…)

For example, the product which has ProductId 12345 is a large bench which has a price of £150.

State **one** additional piece of data which should be included in PRODUCT and give **one** reason why it is needed.

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[2]

(b). You should use only the data given above.

(i) Explain the use of a primary key in this database.

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[2]

(ii) Explain the use of a foreign key in this database.

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[4]

4. A programmer needs to design a database to hold details about customers and their orders for an online company.

A database contains three tables labelled Customer, Order and Item. Draw an Entity-Relationship Diagram for these where a Customer can have many Orders and an Order can have many Items.

[3]

5(a). An insurance company's offices have a large number of black and white printers.

The company's technicians keep accurate records of the printers in the building, and the quantity of toner cartridges in stock, in a flat file database. An extract of the database is shown in Fig. 1.

Printer Model	Location	Notes	Cartridge Code	Quantity in stock	Re-order URL
LasPrint LP753	office 3		LP-7XB	12	www.megacheapprint.com / toner / LP-7XB
LasPrint LP710	office 6	drum replaced	LP-7XB	12	www.megacheapprint.com / toner / LP-7XB
Zodiac ZN217	reception		Zod17	4	www.zodiaclaserprinting.com / shop / Z17
Zodiac ZN217	conference Room 2	had to add RAM	Zod17	4	www.megacheapprint.com / toner / LP-7XB
LasPrint LP753	office 8		LP-7XB	12	www.megacheapprint.com / toner / LP-7XB

Fig. 1

Describe **two** issues, referring to Fig. 1, that might arise from using a flat file database structure.

1

2

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[4]

(b). A relational database is created with three tables:

- PrinterModel: this stores all the data about each model of printer
- PrinterInstance: this stores the data about each individual printer in the building
- Cartridge: this stores information about the toner cartridges.

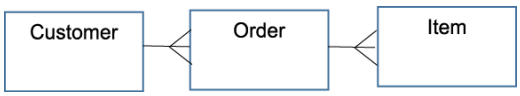
Draw an entity-relationship diagram to show the relationships between the three tables.

[4]

END OF QUESTION PAPER

Question			Answer/Indicative content	Marks	Guidance
1		i	• A primary key must have a unique value for each record (1 – AO1.2) - however it is possible for two films to have the same name (1 – AO2.1).	2	One mark (AO 1.2) for identification of appropriate reason. One mark (AO 2.1) for applying knowledge to given context.
		ii	• A secondary key is indexed allowing for faster searching (1 – AO1.2) and users are likely to want to search by film (1 – AO2.1).	2	One mark (AO 1.2) for identification of appropriate reason. One mark (AO 2.1) for applying knowledge to given context.
			Total	4	
2	a		Mark band 6-8. High level response. Candidate has discussed both storage methods in detail & related them to the applications. Candidate has used appropriate technical terminology throughout. There are few, if any, spelling errors or grammatical errors. Mark band 3-5. Medium level response. Candidate has discussed both storage methods. Some attempt has been made to relate the methods to the applications. Candidate has used some technical terminology in the response. There may be spelling errors or grammatical errors, but they are not obtrusive. Mark band 0-2. Low level response. Candidate has listed some relevant points but failed to discuss the storage methods in any detail or relate them to the applications. There is a lack of cohesion in the response. Candidate has failed to use correct technical terms in the response. Spelling and grammatical errors affect the readability of the response. *Points may include:* *Flat files*	8	Examiner's Comments The second of the banded response questions, this question was good at differentiating, those who tended towards the lower end of the marking scale did tend to be very repetitious.

Question			Answer/Indicative content	Marks	Guidance
			Limited amount of data Limited technical expertise available in family Data format difficult to change Security not a major issue for family compared with company *Relational database* Software may be available as part of computer package Technical help readily available on-line Easy to add data Easy to link to other applications / e.g. address labels Large volume of data for company Saves space / reduces data duplication / redundant data Improves data consistency / integrity Easy to change data format Improves security / easy to control access to data		
	b	i	Unique identifier	1	**Examiner's Comments** A standard question that almost every candidate got right with only one possible answer.
		ii	Primary key in one table… …used as an attribute / foreign key in another Provides a link between tables Represents many-one relationship	3	**Examiner's Comments** This was very well answered and most students managed at least two marks, those that did not achieve the full three marks generally did not give a complete enough description for the first two marks in the mark scheme.
			Total	**12**	

Question			Answer/Indicative content	Marks	Guidance
3	a		*e.g.* • NoInStock… • …to check stock levels / allow re-ordering • Location (in warehouse)… • …to find item when needed	2	Marks for single example with reason only Accept other relevant examples **Examiner's Comments** A very open ended question that was designed to test candidates' ability to hypothesise about what should be in a database, most candidates achieved a creditable answer.
	b	i	• Unique identifier • ProductId identifies a product / OrderId identifies an order	2	**Examiner's Comments** Most students got the “Unique identifier” as was expected, a few were able to go on and say what it was used for. Most candidates were assumed to have not read the question correctly.
		ii	• Primary key from one table used as an attribute in another table • to link tables / represent relationship • ProductId (is foreign key) in ORDER… • …to show which product has been ordered	4	**Examiner's Comments** A well answered question.
			Total	**8**	
4			• Correct names • 1 to many between Customer and Order • 1 to many between Order and Item 	3	CAO **Examiner's Comments** As was expected most candidates got the full three marks on this. The most common mistake was not using proper names; candidates seemed to feel the need to make everything plural.
			Total	**3**	

Question			Answer/Indicative content	Marks	Guidance
5	a		• Data might be inconsistent…(A01.1) • … For example the amount of LP-7XB toner cartridges might be reduced in one record but not in other records. (A02.2) • Space is wasted through redundant data… (A01.1) • … For example the Re-order URL for each toner cartridge is stored multiple times. (A02.2)	4	**Examiner's Comments** Many candidates achieved some marks on this question. However some did not use the terminology expected at this level of study e.g. data redundancy; data inconsistency.
	b		• Entities and relationships drawn using standard notation. (AO1.1) • Cartridge linked to PrinterModel, PrinterModel linked to PrinterInstance with no other links. (AO 2.1) • 1:M relationship from Cartridge to Printer Model (AO 2.1) • 1:M relationship from PrinterModel to PrinterInstance. (AO 2.1)	4	 **Examiner's Comments** Few candidates scored full marks on this question. Candidates invariably associated the 'cartridge' entity directly with the 'printer instance' entity, not gaining credit. Many diagrams had no indication of the degree of relationship between entities, again not gaining credit.
			Total	8	