

國立臺北科技大學一百零三學年第一學期

電機系博士班資格考試試題範本說明

- 一. 本系博士班資格考試試題為 A4 格式之版面。
- 二. 提供之試題範本自第 1 頁起提供 A4 格式之版面共 4 頁，若有不足請自行加頁。
- 三. 本範本以 Office 之 Word 文書應用軟體製作，命題委員至少須輸入之資料共四項，各項簡要說明如下：(前三項請依範本上之原字型與字型大小輸入，**前二項已代為執行合併列印套稿，請確認組別名稱與考試科目**。謝謝您！)

(一) **【考試科目名稱】** ⇒ [依所附檔案內**考試科目名稱**完整輸入取代]

(二) ⇒ [請依試題**題數**輸入取代並增加**必要之配分**與**各項特殊規定**]

注意事項：

1. 本試題共 **【10】** 題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。

(三)

試題本文 ⇒ [請輸入**題號**與**試題內容**並完成排版與列印]

範本版面說明

試題本文之外方格線，係以單格表格並以隱藏格線方式設計，請在格線內命題，不要超出格線外；若有圖片，亦請於列印後黏貼於規劃版面內。謝謝！

- 四. 命題版面達 A4 共 2 頁(含)以上時，請修改範本第 1 頁之 **第一頁 共一頁** 為 **第一頁 共二頁**；若頁數更多，請類推修改增加之。
- 五. 本範本檔案及考試科目名稱檔案，將由本系以隨身碟提供命題委員，請命題委員在規劃版面內命題，**並以 A4 紙張列印出試題繳交，隨身碟亦請交給本系**。本系將直接列印後隨即製版，不再作其他處理，若有圖片請自行黏貼於妥當之版面位置。

國立臺北科技大學

一百零三學年第一學期電機系博士班資格考試

資料庫 試題

第一頁 共二頁

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4. 考試時間：二小時。

1. Define multivalued dependency (5 points) and 4NF (5 points).

2. What is the difference between B-tree and B⁺-tree. (5 points)

3. Consider the following relations with underlined primary keys.

Employee (Ssn, Ename, Salary, Dnum)

Department (Dnum, Dname, Phone)

Here a department can have many assigned employees but each employee is assigned to exactly one department.

(a) Draw the ER diagram of the above schema. (5 points)

(b) Specify the following queries in SQL.

(i) List the names of all departments that have more than one employee. (5 points)

(ii) List the names of all departments that have no employee. (5 points)

(c) Specify the following queries in relational algebra.

(i) List the names of all departments that have exactly one employee. (5 points)

(ii) List the names of all departments that have maximum number of employees. (5 points)

4. What are the three data anomalies that are likely to occur as a result of data redundancy in database table? (5 points) How can such anomalies be eliminated? (5 points)

5. What are the requirements of union compatibility? (5 points)

6. Consider the schedule $S = r_1(B); w_4(A); r_1(A); w_3(A); r_2(A); w_2(B)$
 - (a) Give the precedence graph for the schedule S . (5 points)
 - (b) If the schedule S is conflict-serializable, give one equivalent serial schedule. If the schedule S is not conflict-serializable, explain why not. (5 points)

7. Briefly explain the four constraints on specializations and generalizations in the EER model. (5 points)

8. What is a timestamp? (5 points) How does the system generate timestamp? (5 points)

9. Briefly explain the differences between shared locks and exclusive locks? (5 points)

10. Consider the relation $R(A, B, C, D)$ with the following functional dependencies:
$$F = \{ A \rightarrow BCD, B \rightarrow C, CD \rightarrow A \}.$$
 - (a) Find all keys in $R(A, B, C, D)$. (5 points)
 - (b) Is R in 3NF? Explain your answer. (5 points)
 - (c) Is R in BCNF? Explain your answer. (5 points)