國立臺北科技大學一百零四學年第一學期

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

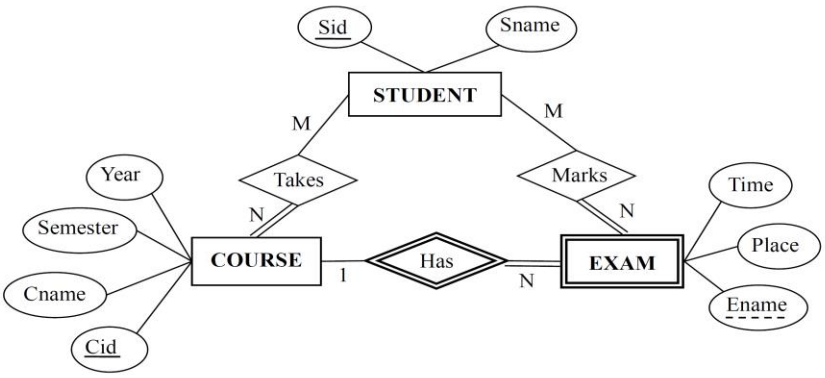
一百零七學年第二學期電機系博士班資格考試

資料庫 試題

注意事項：

1. 本試題共【5】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。

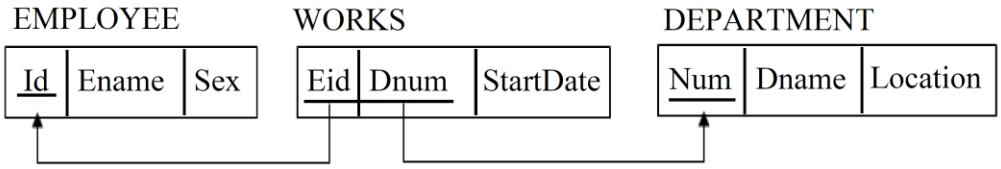
1. Consider the ER diagram of the following figure, which shows a student-course-exam database.



(a) Extract from the ER diagram the requirements and constraints that produced this schema. [10pts]

(b) Map the ER diagram into a set of relations. Remember to indicate the primary key of each relation and all referential-integrity constraints (foreign-key constraints) between the relations. [10pts]

2. Specify the following queries in SQL on the COMPANY relational database schema shown in the following figure. (Note: An employee can work in more than one department)



(a) List the names of all female employees who work in the departments located in "Taipei". [10pts]

(b) List the names of all departments which have more than 10 employees. [10pts]

3. Consider the relation schema $R(A, B, C, D, E, F, G)$ and the set of functional dependencies $F=\{A\rightarrow B, C\rightarrow D, AC\rightarrow EF, F\rightarrow G\}$.

(a) What is the key(s) for R? [5pts]

(b) Decompose R into 2NF, then 3NF relations. State the reasons behind each decomposition. [10pts]

4. Consider the relation schema $R(A, B, C, D, E)$, the set of functional dependencies $F=\{A\rightarrow B, A\rightarrow E, B\rightarrow E, C\rightarrow D\}$, and the decomposition $D=\{R_1(A, B, C, D), R_2(A, C, E)\}$.

(a) Determine whether the decomposition D has the dependency preservation property. Explain your answer. [10pts]

(b) Determine whether the decomposition D has the nonadditive (lossless) join property. Explain your answer. [10pts]

5. Consider the schedule $S = w_1(A); w_2(A); r_2(B); w_1(B); c_1; r_2(A)$. (Note: $w_i(X)$ denotes transaction i wrote the item X; $r_i(X)$ denotes transaction i read the item X; and c_i denotes transaction i commits)

(a) What operation(s), if any, does the $w_1(A)$ conflict with in the schedule S? [5pts]

(b) Determine whether the schedule S is strict, cascadeless, recoverable, or nonrecoverable. Explain your answer. (Determine the strictest recoverability condition that the schedule S satisfies.) [10pts]

(c) Is the schedule S conflict-serializable? why? [10pts]