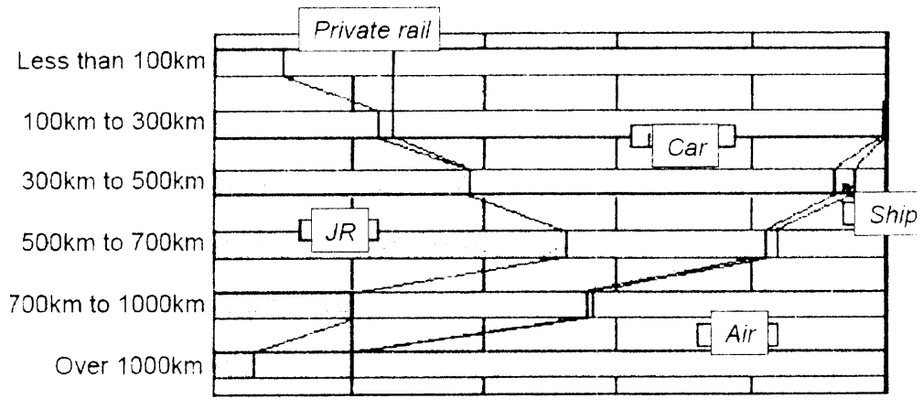
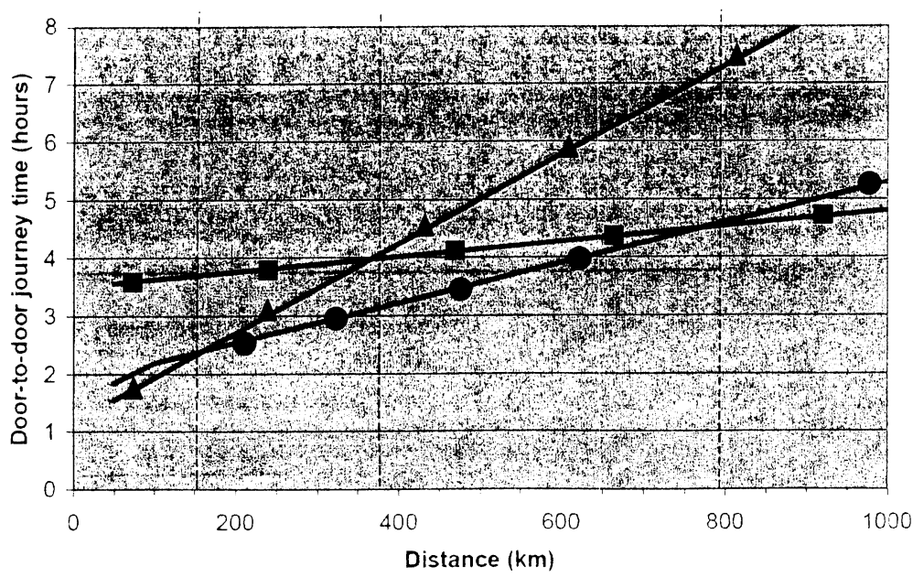
1. 請以學理解釋爲何以四次拋物線佈設之緩和曲線比三次拋物線具有更優越之舒適度？(20 %)

2. 下圖顯示 1998 年日本國內運輸統計(JR 代表日本鐵路公司)，及三種運輸模式的運輸距離時間關係圖。請依圖上記號寫出何者爲高速鐵路、何者爲航空運輸？(10%) 另請比較兩圖有哪些相互呼應吻合的現象，有哪些有待解釋的現象？ (10%)





3. 路基工程是關係運輸設施壽命與品質的最重要關鍵之一。請說明如何確保路基的品質？ (15%)

4. 請比較公路車輛、鐵路列車、及機場航機等三者對地面載重特性有哪些不同？(15%)

（背面仍有題目，請繼續作答）

5. 請 逐句 翻譯(或扼要說明理念)下列段落. (15%)

Last decades of the 20th century brought new trends and new requirements for road infrastructure design, connected with safety, preservation of the environment and aesthetics. Road users and a large group of experts from eight European countries agree, that aesthetics in mobility environment (road infrastructure, public space in urban and suburban environment) has a great impact into the quality of transport system. This new approach to road design practice is expressed in the four-component relationship, namely: *"driver – environment – road – vehicle"*. Modern designing of highways faces the challenge of incorporating community values and safety, efficiency and effective mechanisms to the movement of people and goods. Engineers who make projects of modern highways should be able to find such a design solutions that take into account all, sometimes conflicting, objectives. Innovative thinking is required in the consideration of scenic, historic, aesthetic, and other cultural values, along with the safety and mobility needs of today's transportation system. New directions in road research and education are emerging. The search for such a model of design that respects all the four interrelated components of today's philosophy of a modern road is essential. *Computer visualization* is becoming the most promising link efficiently connecting all the components of the system.

6. 請翻譯下列段落. (15%)

The United States built an enormous transportation infrastructure in the 20th century; replacement would cost trillions of dollars. Roads, bridges, locks, channels, runways, terminals, and rail lines are made of durable materials that appear capable of lasting for many more decades—but will not. On the inland waterways, for example, approximately half of the locks maintained by the U.S. Army Corps of Engineers are more than 50 years old, in use beyond their designed service lives. Maintaining and upgrading the infrastructure is costly. For example, the cost of maintaining highways, bridges, and transit is $91 billion annually—$17 billion more than has been invested. Upgrading the facilities to keep up with demand would require a total of $128 billion. Research can yield cost-saving innovations that can extend the life of these assets—for example, with advanced technologies to identify problematic components that can be replaced or repaired before failing.