考試時間	月 日上午 下午第 節 （星期 ）晚間	份數		任課教師	

國立臺灣科技大學 102學年度第 2 學期 博士班考試命題用紙 第 1 頁共 1 頁

考試科目：Computer Network

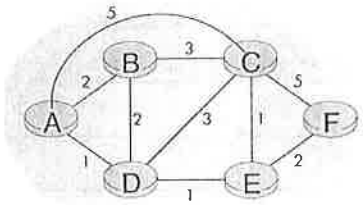
☑研究所
☐大學部
☐工程在職進修

系班別：資科

1. [14%] Explain in detail the following terminology:
   1). Recursive DNS query;
   2). UDP.

2. [21%] Suppose there is a 10 Mbps microwave link between a geostationary satellite and its base station (BS) on Earth with distance of 36,000 km. Every minute the satellite takes a digital photo and sends it to the BS. Assume a propagation speed of 2.4×10^8 m/sec. (a) What is the propagation delay of the link? (b) What is the bandwidth-delay product? (c) What is the minimum size of photo for the microwave link to be continuously transmitting?

3. [15%] Consider the following network. With the indicated link costs, use the Dijkstra's shortest path algorithm to compute the shortest path from node *F* to all network nodes. Show the details using a table.



4. Suppose three active nodes – nodes A, B, and C—are competing for access to a channel using slotted ALOHA. Assume each node has an infinite number of packets to send. Each node attempts to transmit in each slot with probability p. The first slot is numbered slot 1, the second slot is numbered slot 2, and so on. (12%)
   a. What is the probability that node A succeeds for the first time in slot 4?
   b. What is the probability that some node (either A, B, or C) succeeds in slot 2?
   c. What is the probability that the first success occurs in slot 4?
   d. What is the efficiency of this three-node system?

5. Please briefly describe the protocols of CSMA/CD in Ethernet and CSMA/CA in 802.11 as well as line out their advantages and their disadvantages. (20%)

6. Please briefly describe how RTS and CTS operate as well as why they can be adapted to prevent hidden terminal problem in 802.11 MAC. (18%)