編號：F 396　系所：交通管理科學系甲組　　科目：運輸學

本試題是否可以使用計算機：☑可使用，□不可使用　（請命題老師勾選）

1. (20%)名詞解釋

   (a) Radio Frequency Identification (RFID)

   (b) Kyoto Protocol

   (c) National Intelligent Transportation Infrastructure (NITI)

   (d) Centralized Traffic Control (CTC)

   (e) Container Freight Station (CFS)

2. (10%) 空中交通管制可劃分為三部分 (area control，terminal approach control，tower control)，請說明各部分的性質與服務範圍。

3. (10%) 請說明影響鐵路路線容量(line capacity)的因素。

4. (10%) 請說明物流 (Logistics) 與供應鏈管理 (Supply Chain Management) 的意義。

5. (10%) 請就 Electronic Toll Collections (ETC) 的課題，探討可能通訊技術(如紅外線與微波)的差異與優缺點。

6. (10%) 請說明現有大眾運輸補貼相關辦法與可能對大眾運輸業者造成的影響。

7. (10 %) 解釋服務水準 (Level of Service) 之意義，並討論下列交通設施之服務水準指標：公路 (Freeway)，號誌化路口 (Signalized Intersection)，大眾捷運 (Transit)，行人步道 (Pedestrian)。

(背面仍有題目，請繼續作答)

8. (20%) A railroad runs from A to B, a distance of 500 km, through mountainous terrain. The present one-way travel time (including time at intermediate yards) is 20 hours, and the rail freight rate is $500 per ton. There is a truck service which competes with the railroad, running over roughly parallel roads for approximately the same distance, at an average speed of 45 kph and at a rate of $800 per ton. A new highway is planned to replace the existing road; while there is some auto traffic, it is expected that most of the traffic will be trucks. The service function of the new facility is $t_T = t_0 + bV_T$, where V_T is the total volume in trucks per hour (the anticipated auto usage is negligible), t_0 = 10 hours, b = 0.08 hour per truck per hour. The railroad's estimate of the demand function is

$$\frac{V_T}{V_R} = a_0\left(\frac{t_T}{t_R}\right)^{a_1}\left(\frac{C_T}{C_R}\right)^{a_2}$$

Where t_T and t_R are the trip times by truck and rail, respectively, C_T and C_R are the rates, V_T and V_R are the volumes, and a_0, a_1, and a_2 are parameters. The total volume is likely to remain constant at $V_{TOT} = V_T + V_R$ = 200 truckloads per hour. The rail system is utilized at only a fraction of capacity, so its service function is flat – travel time is constant independent of volume.

a. if a_0 = 1, a_1 = -1, and a_2 = -2 find the present volumes of truck and rail.

b. Make an approximation estimate of the equilibrium flows if the new highway were built.

c. Discuss the advantages and disadvantages of the new highway.