UNIVERSITY
OF
JOHANNESBURG

PROGRAM	:	B TECH CIVIL ENGINEERING TECHNOLOGY
SUBJECT	:	**TRANSPORTATION PLANNING**
CODE	:	**TPP411**
DATE	:	SUMMER SSA EXAMINATION 2015 8 DECEMBER 2015
DURATION	:	(SESSION 1) 08:00 - 11:00
WEIGHT	:	60 : 40
TOTAL MARKS	:	100

ASSESSOR	:	DR H A QUAINOO
MODERATOR	:	MR I. ARIYO
NUMBER OF PAGES	:	5

INSTRUCTIONS	:	QUESTION PAPERS MUST BE HANDED IN.
REQUIREMENTS	:	NONE

INSTRUCTIONS TO STUDENTS:

PLEASE ANSWER ALL THE QUESTIONS.

[5 marks]

Question 2

A transportation survey during the last ten months yielded the data in Table 2 relating Trip generated in an urban centre divided into 10 zones to Employment and Car Ownership.

Table 2: Trip Generated, Employment levels and *zonal* Car ownership

Zone	Employment ('00) X_1	Car Ownership ('00) X_2	Trip generated, ('000) Y
1	45	16	29
2	42	14	24
3	44	15	27
4	45	13	25
5	43	13	26
6	46	14	28
7	44	16	30
8	45	16	28
9	44	15	28
10	43	15	27

(a) Develop a multiple regression (Trip Generation) model for the above data.

(b) If the level of employment and car ownership were to be constant at 4, 200 and 1,600 respectively, what would be the expected number of trips generated in a zone?

(c) Calculate the Standard Error of the regression trip generation model in (a) and interpret its significance in relation to the answer in (b) above.

[Hint: important formulae to apply are as follows:

$\Sigma Y = na + b_1\Sigma X_1 + b_2\Sigma X_2$

$\Sigma X_1 Y = a\Sigma X_1 + b_1\Sigma X_1^2 + b_2\Sigma X_1 X_2$

$\Sigma X_2 Y = a\Sigma X_2 + b_1\Sigma X_1 X_2 + b_2\Sigma X_2^2$

Se = Square root of $\{\Sigma (Y - \hat{Y})^2 / (n-k-1)\}$

where Se = Standard error

Y = Sample values of the dependent variable

$\hat{Y}$ = Corresponding estimated values from the regression equation

n = number of zones

k = number of independent variables

[25 marks]

Question 3

A transport study is being undertaken incorporating three zones 1, 2 and 3. The estimated future work trip production and attractions are presented in Table 3.1 The travel costs between these zones in generalised time units as well as the disincentive to travel (in the form

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Question 4

Company X manufactures Television Aerials in three different production centres, 1, 2 and 3, and markets them through three retail stores, 5, 6 and 7 as shown in Figure 4.1. The symbols "S" and "D" denote the supply and demand respectively. The number on each link represents the unit cost (in Rand) for transporting the mobile phones from each source to specific destinations. The company wishes to establish the quantity to be transported from each source to respective destinations in order to minimise overall total cost and simultaneously satisfy all the supply and demand constraints.

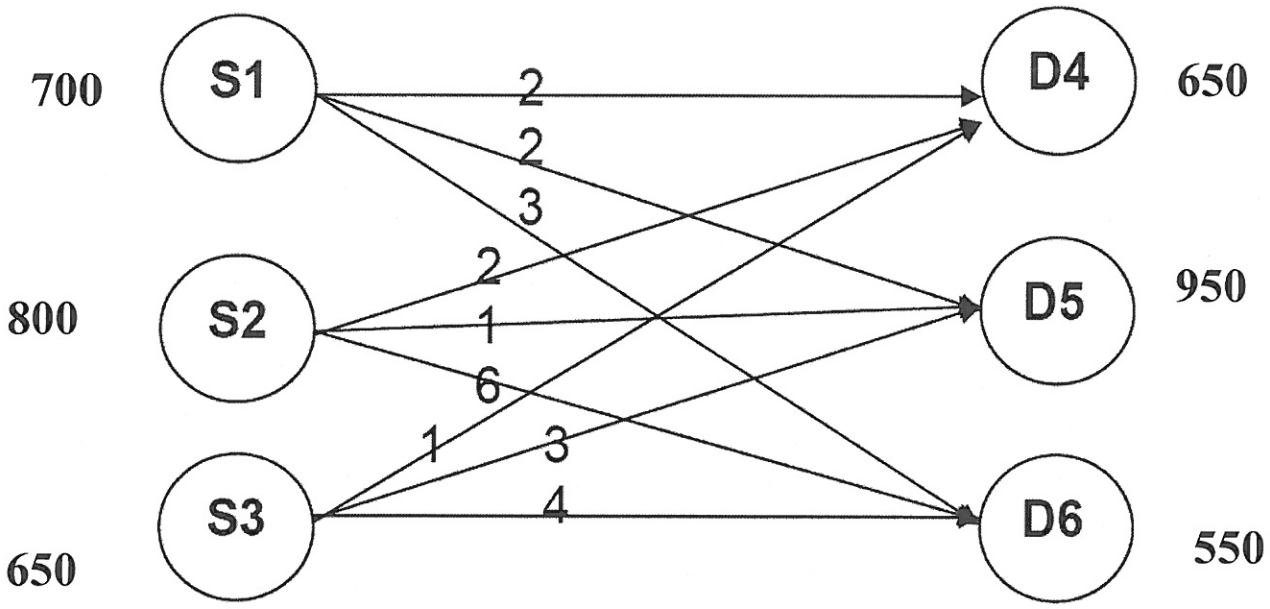

Figure 4.1

(a) Formulate the problem as a Linear Programming model
(b) Determine the initial feasible solution using both the North West Corner Method and the Least Cost Method. Comment on the answers obtained.
(c) Hence deriving from the initial feasible solution obtained through the North West Method, use the Stepping Stone Method to determine the optimum solution to the transportation problem.

[25 marks]

TOTAL MARKS = 100