TERTIARY AND VOCATIONAL EDUCATION COMMISSION

COMMON WRITTEN EXAMINATION

NVQ Level 05 - Semester I		
Quantity Surveying		
Mathematical Concepts in Quantity Surveying	**F45C002M01**	**Three Hours**
*** Answer any five questions**		

QUESTION -01

a) – Solve the following quadratic and linear equations.

I. $2x^2 - 3x - 5 = 0$
II. $5(y-2) + 3(y+2) = 7y + 14$ (marks-2x2=4)

b) - Solve these equations by completing square

I. $x^2 + 8x = 0$
II. $2x^2 + 12x - 16 = 0$ (marks-2x2=4)

c) – Fill in the missing terms,

l. $\frac{2b}{8c} = \frac{}{4c}$ ll. $\frac{5}{13y} = \frac{}{26y^2}$ (marks-2x2=4)

d) – Provide examples for,

I. Square matrix
II. Identity matrix
III. Raw matrix
IV. Column matrix (marks-2x4=8)

QUESTION -02

a) – Sketch the parabola shown below on X-Y plane and find the coordinates of the vertex. (Use the discriminant as well)

$y = 8 + 4x + x^2$ (marks-12)

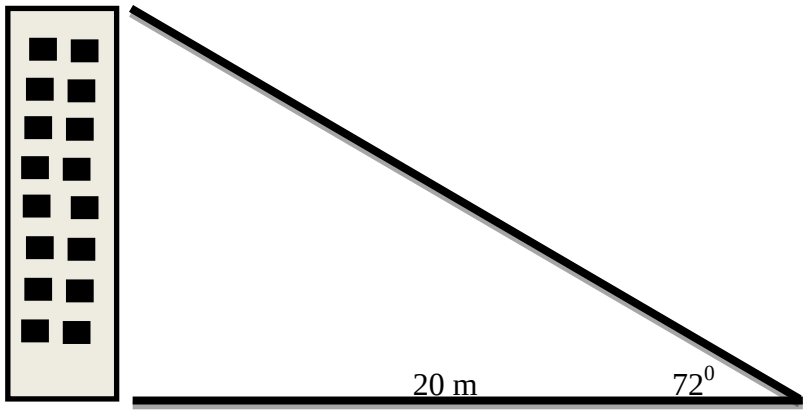
b) – Show that the shape of parabola how to depends with the discriminant.

(marks-08)

QUESTION -03

a) – Find the height of the building shown below.

(Sin 72^0=0.951, Cos 72^0=0.309 and Tan 72^0=0.3.078)



(marks-6)

b) – Prove that the Pythagorean Identities below with the help of suitable figures,

i)- $Sin^2\theta + Cos^2\theta = 1$

ii)- $Cosec^2\theta - Cot^2\theta = 1$ (marks-2x2=4)

c) – Prove that the "cosine law" with the help of suitable type of triangle. (marks-6)

d) – Prove that the Pythagoras theorem with cosine rule. (marks-4)

QUESTION -04

a) – If A = $\begin{bmatrix} 4 & 2 \\ 9 & 5 \end{bmatrix}$ and B = $\begin{bmatrix} -6 & 4 \\ 8 & -1 \end{bmatrix}$ derive commands expressing below,

l. B x A ll. A x B (marks-2x2=4)

b) – Find x and y values of simultaneous equations showing below with matrix calculations.

* $2x + 3y - 14 = 1$

* $2y - x - 6 = 5$ (marks-8)

c) – Find the inverse of the following matrix and prove that the $\mathbf{A} \cdot \mathbf{A}^{-1} = \mathbf{I}$ (Identity matrix)

Note; Find the Adjoint and Determinant separately.

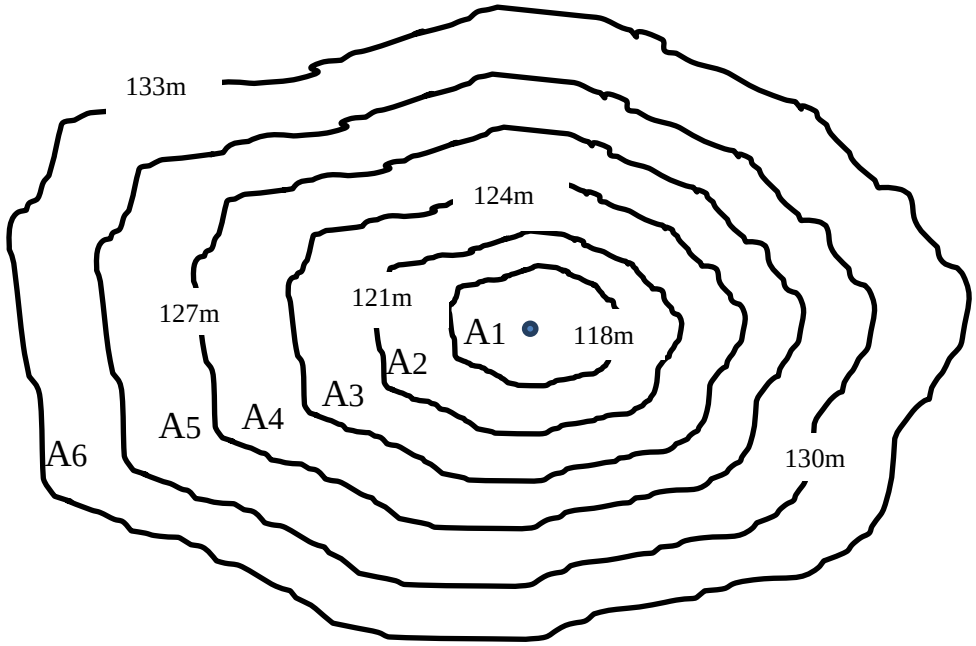
A = $\begin{bmatrix} -5 & -2 \\ -1 & 4 \end{bmatrix}$ (marks-8)

QUESTION -05

a) – The below figure shows the contour map of a village reservoir proposed to recirculate for irrigation purposes.

By referring the contour map and given table, find out the maximum water capacity can store & distribute to the irrigation purposes. (marks-12)

Area Ref: No:	**Area (ha)**
A1	1
A2	3
A3	4
A4	7
A5	11
A6	16



b) – Design Engineers have a proposal for construct a dam to raise a water store level up to 140m with 4m of free board and it can cover 22 hectare of catchment area at 136m level. What is the maximum safe water capacity can store in the reservoir according to the new proposal?

(marks-8)

QUESTION -06

a) – The distribution of the income (in 1000 of rupees) of the employees in large firm are as follows, Find the **Mean** and **Standard Deviation**. (marks-16)

Income (Rs.1000)	**Number of employees** *fi*	*xi*	*fi*	*di*	*fidi*	$(fidi)^2$
50 – 60	20					
60 – 70	30					
70 – 80	45					
80 – 90	55					
90 - 100	50					

b) – Find the 40^{th} and 95^{th} percentiles of given data set below, (marks-4)

6,	12,	14,	15,	15,	8,	9,	18,	10,	10,
24,	20,	28,	17,	16,	21,	15,	18,	22,	16.