

**BOLTON INSTITUTE OF HIGHER EDUCATION  
B.A./B.Sc. COMBINED STUDIES  
MATHEMATICS PATHWAY**

**LEVEL 1 MODULE: MATHEMATICS AS THE LANGUAGE OF SCIENCE**

**TERMINAL EXAM**

**SEMESTER 2**

**1997/1998**

**Date: Tuesday 2nd June 1998**

**Time: 6.30-8.15  
(6.60-6.45 reading time)**

---

**Instructions to the candidates:**

1. The first 15 minutes is reading time. Do not write in your answer book until this time is complete.
2. Maximum marks for each part/question are shown in brackets.
3. Answer 4 questions.
4. Each question carries equal marks.

**Materials required:**

1. Answer Books
2. Formulae Books

School of Civil Engineering and Building  
B. Eng. (Hons)/B. Eng. Degree in Civil Engineering  
Second Level Referred Examinations  
Engineering Mathematics

1. (a) In analysing the equilibrium of a portion of a steel framework the following equations were obtained connecting the forces  $F_1$ ,  $F_2$ , and  $F_3$ .

$$\begin{aligned}2F_1 + 6F_2 + 14F_3 &= 600 \\4F_1 + 9F_2 + 13F_3 &= 300 \\-F_1 + 3F_2 + 24F_3 &= 1700\end{aligned}$$

Find the inverse of the matrix of coefficients of  $F_1$ ,  $F_2$ , and  $F_3$  and hence solve the equations.

[8 marks]

- (b) A square matrix  $A$  has been partitioned to the form  $A = \begin{pmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{pmatrix}$  where  
.....