

Name:..... Student Number:.....

**Q1:** Let  $P$  be the relation on  $A = \{1, 2, 3, 4, 5\}$  represented by the following matrix

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 \end{pmatrix}$$

1. List all ordered pairs of  $P$ . (1 marks)

.....  
.....

2. Show that  $P$  is a partial ordering relation. (3 marks)

.....  
.....  
.....  
.....  
.....  
.....

3. Represent  $P$  by a hasse diagram. (2 marks)

**Q2:** Let  $E$  be the equivalence relation defined on  $B = \{a, b, c, d, e, f\}$  by  
 $E = \{(a, a), (a, c), (a, f), (b, b), (c, a), (c, c), (c, f), (d, d), (d, e), (e, d), (e, e), (f, a), (f, c), (f, f)\}$ .  
Find all distinct equivalence classes of  $E$ . (2 marks)

.....  
.....  
.....  
.....  
.....  
.....  
.....

**Q3:** Let  $G$  be a graph with degree-sequence:  $x, x, x + 1, x - 1, x - 2, x + 2$ . Find the value of  $x$  if  $G$  has 9 edges. (2 marks)

.....  
.....  
.....  
.....  
.....  
.....