1. Following is a state table for time finite state machine.

| Present State | Next State Output | |
|---|---|---|
| | Input - 0 | Input - 1 |
| $A$ | $B.1$ | $H.1$ |
| $B$ | $F.1$ | $D.1$ |
| $C$ | $D.0$ | $E.1$ |
| $D$ | $C.0$ | $F.1$ |
| $E$ | $D.1$ | $C.1$ |
| $F$ | $C.1$ | $C.1$ |
| $G$ | $C.1$ | $D.1$ |
| $H$ | $C.0$ | $A.1$ |

(A) Find the equivalence partition on the states of the machine
(B) Give the state table for the minimal machine. (Use appropriate names for the equivalent states. for example if states X and Y are equivalent then use XY as the name for the equivalent state in the minimal machine).

**[Gate 1997]**

2. Let N be an NFA with n states. Let k be the number of states of a minimal DFA which is equivalent to N. which one of the following is necessarily true?
(A) $k \geq 2^n$
(B) $k \geq n$
(C) $k \leq n^2$
(D) $k \leq 2^n$

**[Gate 2008]**