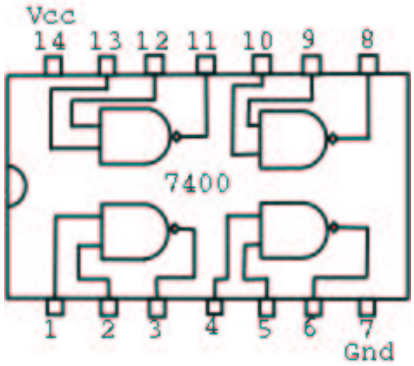
LABORATORY EXERCISE # 2

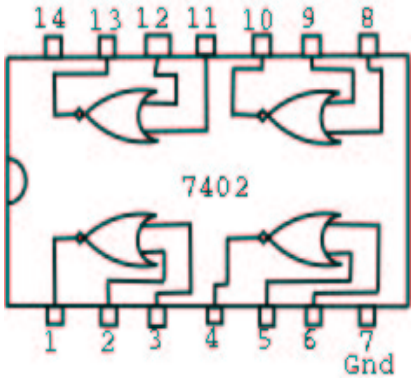
TITLE	STUDY OF BASIC GATES
AIM	To study basic gates.
APPARATUS	Power Supply, Breadboard, Connecting Wires.
COMPONENTS	ICs 7400, 7402, 7404, 7408, 7432, 7486, DIP Switch and LEDs.

IC PINOUTS

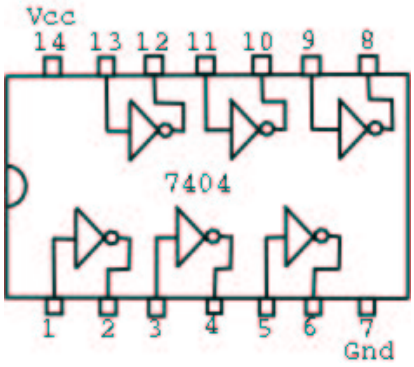


TRUTH/FUNCTION TABLE

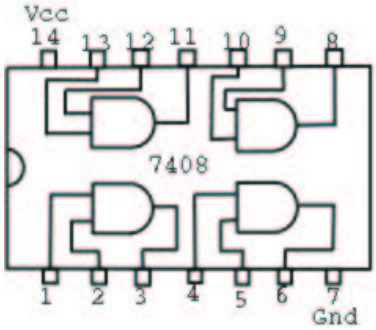
NAND		
A	B	$Y=\overline{A.B}$
0	0	1
0	1	1
1	0	1
1	1	0



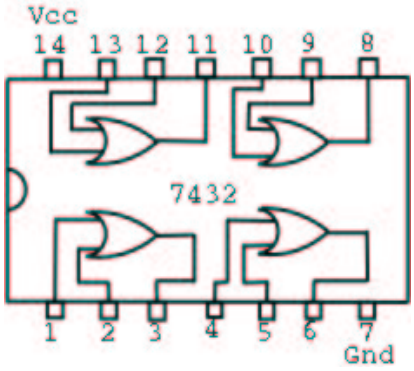
NOR		
A	B	$Y=\overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0



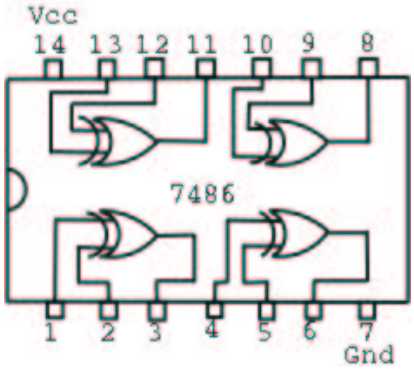
NOT	
A	$Y=\overline{A}$
0	1
1	0



AND		
A	B	Y=A.B
0	0	0
0	1	0
1	0	0
1	1	1



OR		
A	B	Y=A+B
0	0	0
0	1	1
1	E	1
1	¢	1



EX-OR		
A	B	$Y=\bar{A}B+A\bar{B}$
0	0	0
0	1	1
1	0	1
1	1	0

THEORY

Logic gates are the digital circuits with one output and one or more inputs. They are the basic building blocks of any logic circuit. Different logic gates are : **AND, OR, NOT, NAND, NOR, EX-OR.**

Digital circuits have two discrete voltage levels to represent the binary digits (bits) 1 and 0. All digital circuits are switching circuits. Instead of mechanical switches, they use high-speed transistors to represent either an ON condition or an OFF condition. Various types of logic, representing different technologies, are available to logic designers. The choice of a particular family is determined by factors such as speed, cost, availability, noise immunity, and so forth. The key requirement within each family is compatibility; that is, there must be consistency within the logic levels and power supplies of various integrated circuits made by different manufacturers. The experiments in this lab use primarily transistor-transistor logic, or TTL. The detailed performance characteristics of TTL depend on the particular subfamily. However, all TTL is designed to operate from a 5 V power supply, and the logic levels are the same for all TTL integrated circuits.

AND: Logic eqn. Y=A.B. The output of AND gate is true (1) when the inputs A and B are true.

OR: Logic eqn. Y=A+B. The output of OR gate is true when one of the inputs A and B or both the inputs are true.

NOT: Logic eqn. $Y = \bar{A}$. The output of NOT gate is complement of the input.

NAND: Logic eqn. $Y=\overline{A.B}$. The output of NAND gate is true when one of the inputs or both the inputs are low.

NOR: Logical eqn. $Y=\overline{A+B}$. The output of NOR gate is true when both the inputs are low.

EX-OR: Logic eqn. $Y=\bar{A}B+A\bar{B}$. The output of EX-OR gate is true when both the inputs are dissimilar.

PROCEDURE

1)Give biasing to the IC and do necessary connections.
2)Give various combinations of inputs and note down the output with help of LED for all gates one by one.
3)Observe the output and verify the truth tables for all gates.

CONCLUSION Thus all basic gates are studied.

REVIEW QUESTIONS 1) A burglar alarm for a car has a normally LOW (grounded) switch on each of four doors. If any door is opened, the output of that switch goes HIGH. The alarm is set off with an active-LOW output . What type of gate will provide this logic?

2) If more than two input AND & OR gates are available, how will you connect its inputs so that they work as two input gates? Perform it for three and four input AND & OR gates.