

## Practical Cases

- 1- Design a circuit of 8-bit adder/subtractor based on ripple carry adder and prove the correctness of your code.
- 2- Design 16-bit carry look-ahead adder with minimum gate delay that adds  $A_{0-15}$  to  $B_{0-15}$  then produces  $S_{0-15}$  and  $C_{16}$ . Write VHDL code required to design this adder using structural modelling and prove the correctness of your code.
- 3- Design a circuit for 8-bit array(regular) multiplication and prove the correctness of your code.
- 4- Design a circuit for 8-bit array(regular) multiplication for signed numbers (sign extension) and prove the correctness of your code.
- 5- Design a circuit for 8-bit sequential multiplication and prove the correctness of your code.
- 6- Design a circuit for radix-2 Booth's multiplier for multiplying 8-bit operands and prove the correctness of your code.
- 7- Design a circuit for non-restoring division circuit and prove the correctness of your code.
- 8- Design 8-bit ALU with inputs (A , B) and Z as output which is capable of carrying out 16 operation, but for now only implement the following operations:

Instruction	Function
No operation	$Z=A$
ADD	$Z=A+B$
SUB	$Z=A-B$
Increment	$Z=A+1$
Decrement	$Z=A-1$
Zero	$Z=0$
SHL	Shift left
SHR	Shift right
ROL	Rotate left
ROR	Rotate Right

and prove the correctness of your code.