

# School of Basic and Applied Sciences

Course Code : BSCP3005

Course Name: Digital System and Application

## Number System Conversion

### Contents:

- Introduction
- Decimal to any base conversion
- Any base to decimal conversion
- Examples

GALGOTIAS  
UNIVERSITY

# School of Basic and Applied Sciences

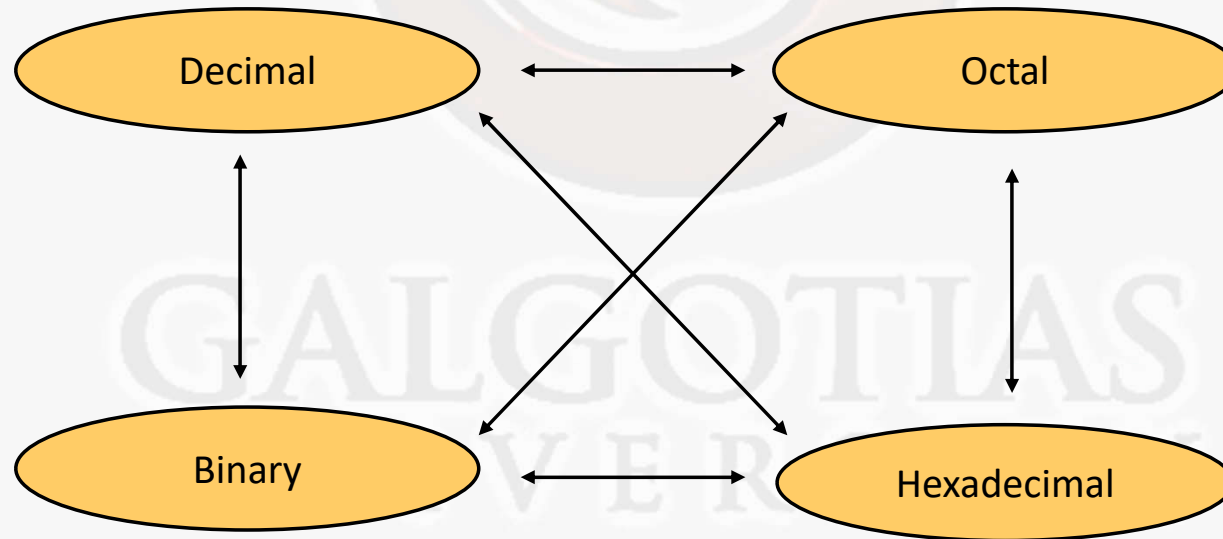
Course Code : BSCP3005

Course Name: Digital System and Application

## Conversion

We need to know how to convert a number in one system to the equivalent number in another system. Since the decimal system is more familiar than the other systems, we first show how to convert from any base to decimal. Then we show how to convert from decimal to any base. Finally, we show how we can easily convert from binary to hexadecimal or octal and vice versa.

- The possibilities:



# School of Basic and Applied Sciences

Course Code : BSCP3005

Course Name: Digital System and Application

## Decimal to any base

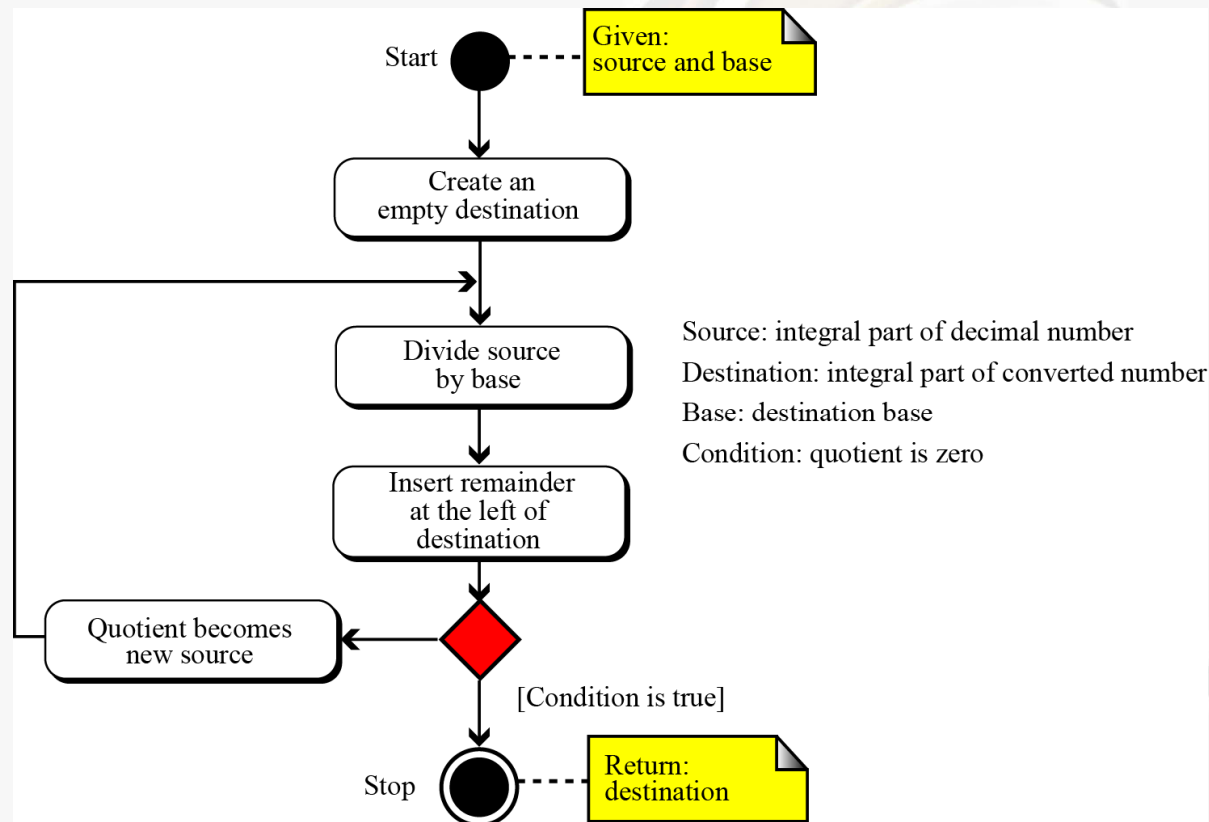
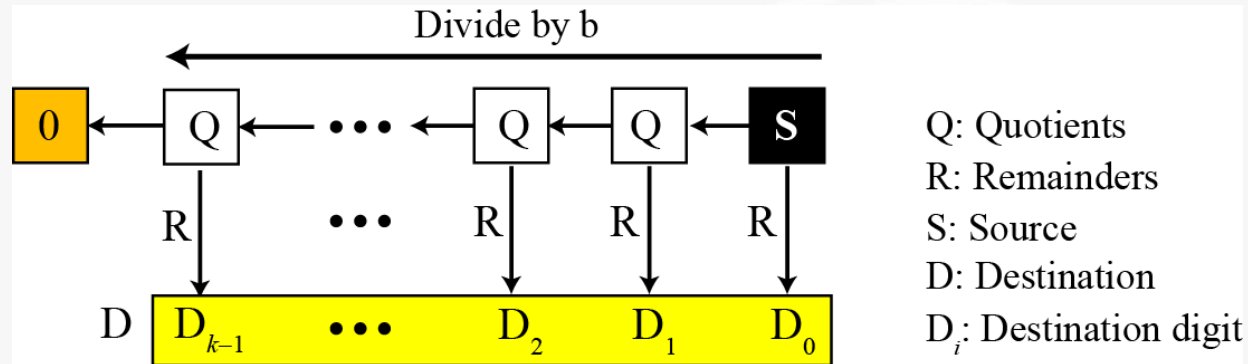


Figure: Converting other bases to decimal (integral part)

# School of Basic and Applied Sciences

Course Code : BSCP3005

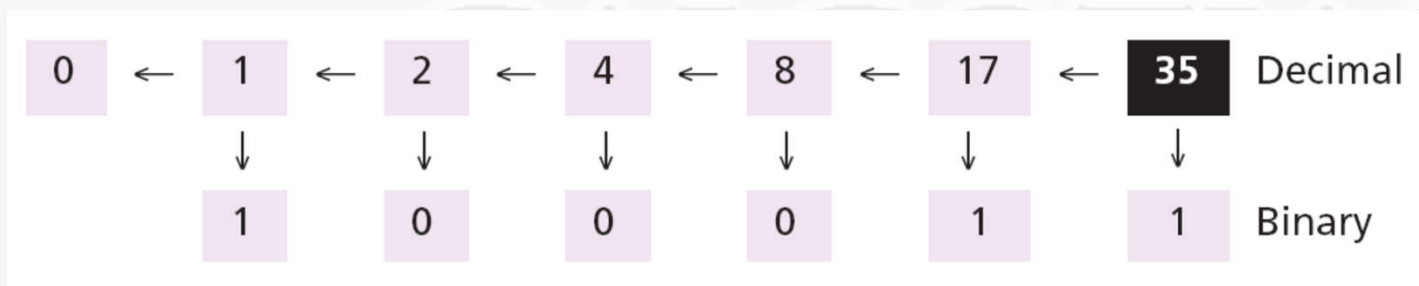
Course Name: Digital System and Application



**Figure:** Converting the integral part of a number in decimal to other bases

## Decimal to Binary Conversion

The following shows how to convert 35 in decimal to binary. We start with the number in decimal, we move to the left while continuously finding the quotients and the remainder of division by 2. The result is  $35 = (100011)_2$ .



# School of Basic and Applied Sciences

Course Code : BSCP3005

Course Name: Digital System and Application

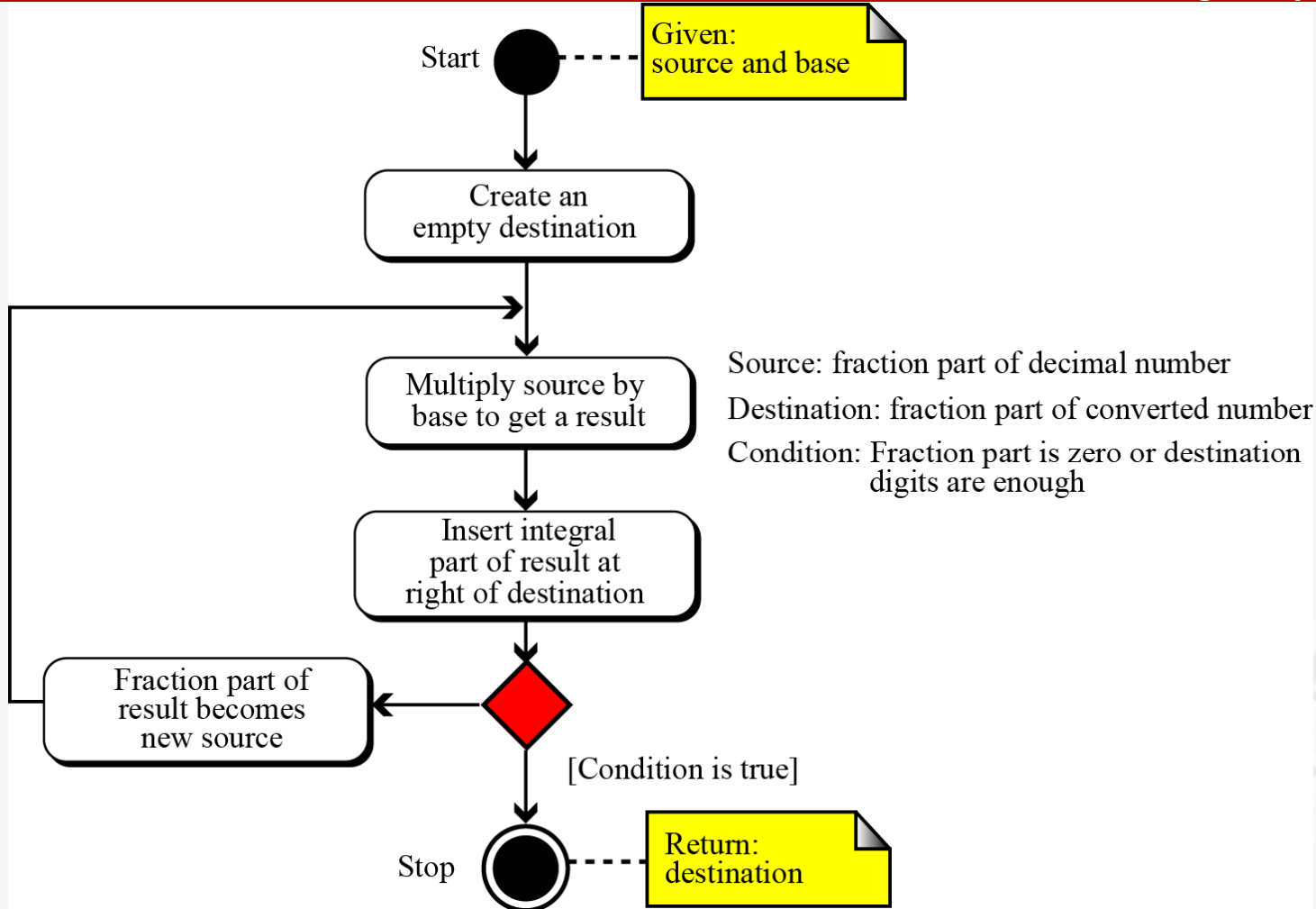


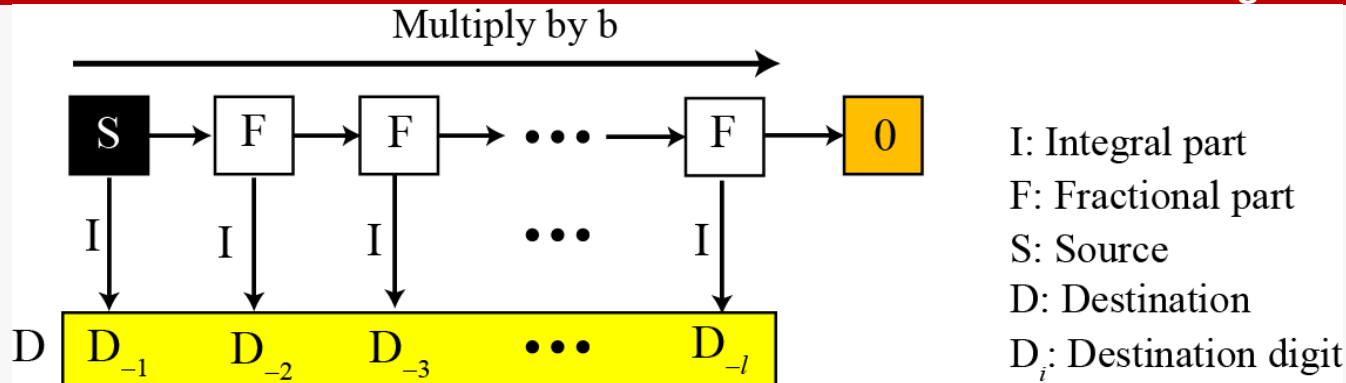
Figure: Converting the fractional part of a number in decimal to other bases

AS  
TY

# School of Basic and Applied Sciences

Course Code : BSCP3005

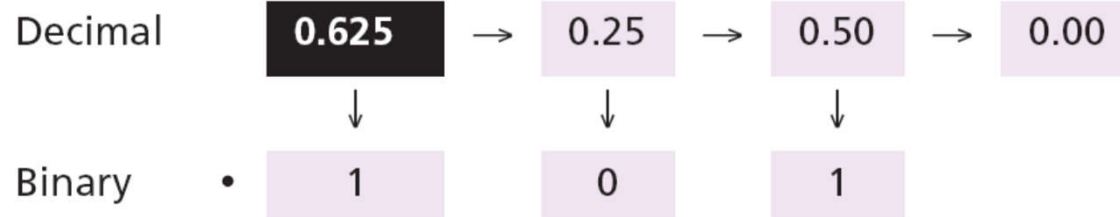
Course Name: Digital System and Application



Note:

The fraction may never become zero.  
Stop when enough digits have been created.

Figure: Converting the fractional part of a number in decimal to other bases



Convert the decimal number 0.625 to binary.

Since the number  $0.625 = (0.101)_2$  has no integral part, the example shows how the fractional part is calculated.

# School of Basic and Applied Sciences

Course Code : BSCP3005

Course Name: Digital System and Application

## Any base to decimal conversion

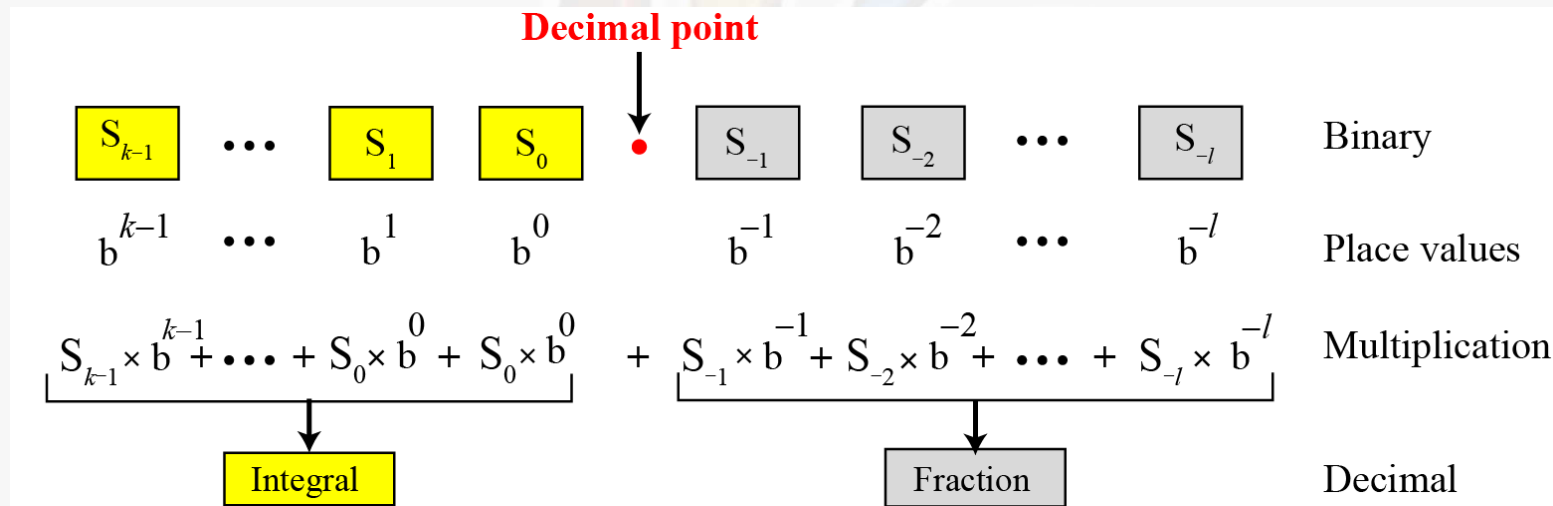


Figure: Converting other bases to decimal

# School of Basic and Applied Sciences

Course Code : BSCP3005

Course Name: Digital System and Application

## Example

The following shows how to convert the binary number  $(110.11)_2$  to decimal:  $(110.11)_2 = 6.75$ .

Binary	1	1	0	•	1	1				
Place values	$2^2$	$2^1$	$2^0$		$2^{-1}$	$2^{-2}$				
Partial results	4	+	2	+	0	+	0.5	+	0.25	
Decimal: 6.75										

GALGOTIAS  
UNIVERSITY



# School of Basic and Applied Sciences

Course Code : BSCP3005

Course Name: Digital System and Application

The number 0 to 15 is represented in binary systems.

Decimal	Binary
00	0000
01	0001
02	0010
03	0011
04	0100
05	0101
06	0110
07	0111
08	1000
09	1001
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111

# School of Basic and Applied Sciences

Course Code : BSCP3005

Course Name: Digital System and Application

## References:

- Digital Principles and Applications, A.P. Malvino, D. P. Leach and Saha, 7<sup>th</sup> Ed., 2011, Tata McGraw Hill
- Digital Fundamentals, Thomas L. Floyd, 11<sup>th</sup> Ed., 2015, Pearson Education Limited
- Modern Digital Electronics, R P Jain, 4<sup>th</sup> Ed., 2010, Tata McGraw Hill

GALGOTIAS  
UNIVERSITY

Name of the Faculty: Dr. Prabhakar Singh

Program Name: B.Sc.(H) Physics