

## Part 1: 20 Multiple-Choice Questions (MCQs)

- Modules 1-12
- Questions will be of the same level of complexity as the NetAcad checkpoints. Review them carefully.
- Excludes all CLI commands related to the configuration of Cisco devices

## Part 2: Development Questions

- up to 4 questions:
  1. CRC - Encoding and decoding
  2. Checksum - Simple calculation in HEX or binary, encoding or decoding
  3. Fragmentation
  4. Scenario-based: Subnetting a Class A, B or C address
  5. Scenario-based: Subnetting using CIDR notation

This will be a closed-book exam. An appendix will be provided with the format of the Ethernet, IPv4, IPv6, protocol data units.

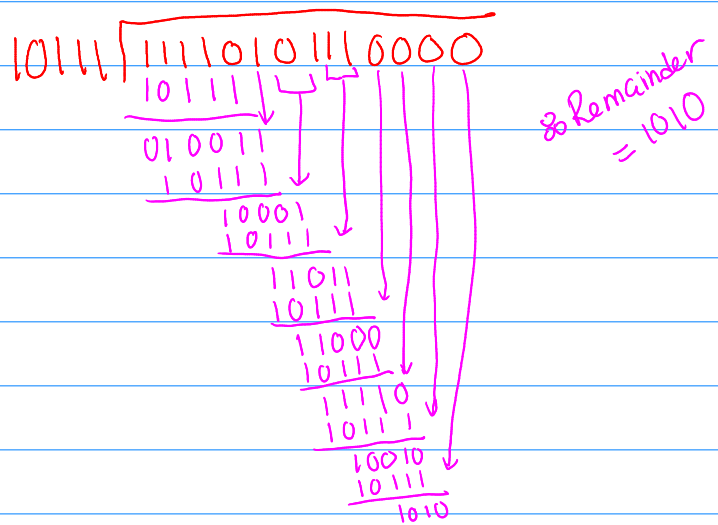
# CRC

dataword = 1111010110000

divisor = 10111  $\rightarrow x^4$  so we add 4 zeros to our dataword

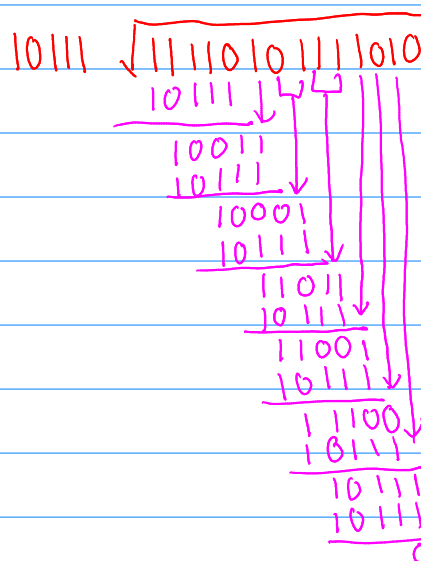
## Encoding

Final Answer  
= data word + Remainder  
= 111101011010



## decode

divisor  $\sqrt{\text{Answer}} = R=0$  !!



so Remainder = 0  
Done !!

# CHECK SUM

$D_1$     $D_2$     $D_3$

$$D_1 + D_2 + D_3 = 1111 \ 1111$$

10111110  
 $D_1$

1111 0101  
 $D_2$

$D_3$

$$\begin{array}{r} 10111110 \\ 11110101 \\ \hline 10110011 \\ 00000001 \\ \hline + 10110100 \end{array} \xrightarrow{\text{1's comp}} \begin{array}{r} 01001011 \\ D_3 \end{array}$$

For Validity check :  $D_1 + D_2 + D_3 = 11111111$   
Calculate

# Fragmentation

Given : ID  
# of options  
Data  
MTU

Example

MTU = 1500 bytes

Options = 8

Data = 5700 bytes

ID = 5CA1

$$1) \text{ header} = 20 + 8$$

$$= 28 \text{ mod } 4 = 0$$

good

$$2) \text{ Data} = 1500 - 28 = 1472$$

$$1472 / 8 = 184 \text{ Valid Offset}$$

$$3) 5700 / 1472 = 3.8 = 4$$

ID	flag	Offset	Data	total Data
5CA1	1	0	1472	$1472 + 28 = 1500$
5CA1	1	184	1472	1500
5CA1	1	$2 \cdot 184$	1472	1500
5CA1	0	$3 \cdot 184$	1284	$1284 + 28 = 1312$

# Classful

A	B	C
255.0.0.0	255.255.0.0	255.255.255.0

4. [10 points] A Canadian company named MapleSys is assigned a Class B network address of 172.60.0.0. The company needs at least 128 usable hosts per subnet.

- What subnet mask should be used?
- Show the first 3 subnets created.
- Assign the first 5 usable IP addresses from subnet 2 to computers.
- Show your calculations clearly.

/24

$$2^7 = 128$$

$$2^8 = 256$$

8 bits

255.255.0000 0000.0000 0000

255.255.255.0

172.60.0.0 - 172.60.0.255  
 172.60.1.0 - 172.60.1.255  
 172.60.2.0 - 172.60.2.255

172.60.0.1, 172.60.0.2, 172.60.0.3, 172.60.0.4  
 172.60.0.5

## CIDR

/27      /18       $2^{10} = 1024$   
 $2^4 = 16$

192.168.3.0 /24 →  $32 - 24 = 8$   
 $2^8 = 256$

$32 - 27 = 5$        $2^5 = 32$   
 $32 - 18 = 14$        $2^{14} = 16 \cdot 1024$

Subnet 64 × 2  
 32 × 2

$2^6 = 64$        $32 - 6 = 26$   
 Range      mask

# bits used      Range

Network ID	Subnet	Broadcast ID
192.168.3.0	192.168.3.1 → 192.168.3.62	192.168.3.63
192.168.3.64	192.168.3.65 → 192.168.3.126	192.168.3.127
192.168.3.128	192.168.3.129 → 192.168.3.158	192.168.3.159
192.168.3.160	192.168.3.161 → 192.168.3.190	192.168.3.191

32       $2^5$   
 $32 - 6 = 27$

Leftover: 192.168.3.192 - 192.168.3.255

AKA: /X →  $32 - X$  → Bits used

Subnet # →  $2^n = \text{Subnet \#}$  →  $32 - n = Y$  → /Y