Activity # 2

Question # 1

(1) 27 mod 11

Multiplicative inverse :

$27 \times x \equiv 1 \pmod{11}$

We have for this

$27 \times 5 = 135$

$(27 \times 5) \bmod 11 = (35) \bmod 4$

$[(27 \bmod 4) \times (5 \bmod 4)] \bmod 11 = 3$

$[5 \times 5] \bmod 11 = 3$

$25 \bmod 11 = 3$

$3 = 3$

So the solution will be 5

Additive inverse:

$$27 + x = 0 \mod 11$$

$$27 + 6 = 33$$

$$(27+6) \mod 11 = 33 \mod 11$$

$$[(27 \mod 11) + (6 \mod 11)] \mod 11 = 0$$

$$[5 + 6] \mod 11 = 0$$

$$0 = 0$$

So 6 is additive inverse.

(2) $102 \mod 4$

$$102 + x = 1 \pmod 4$$

This will not have any solution because 102 and 4 are not co prime so there gcd will be

$$(102, 4) = 2$$

Additive inverse.

$$102 + x = 0 \pmod 4$$

$$102 + 2 = 104$$

$$(102 + 2) \bmod 4 = 104 \bmod 4$$

$$[(102 \bmod 4) + (2 \bmod 4)] \bmod 4 = 0$$

$$[2 + 2] \bmod 4 = 0$$

$$0 = 0$$

So 2 is additive inverse

Question # 2

Play fair cypher

keyword = Asphalt

Z N A U DUST M P E

FC VK @ N RT

A	S	P	H	L
T	B	C	D	E
F	G	I/J	K	M
N	O	Q	R	U
V	W	X	Y	Z

Z . N

↓ ↓

V U

N	O	Q	R	U
V	W	X	Y	Z

A U

↓ ↓

L N

A	S	P	H	L
T	B	C	D	E
F	G	I/J	K	M
N	O	Q	R	U

D U

↓ ↓

E R

D	E
K	M
R	U

S T
↓ ↓
A B

A	S
T	B

MP
↓ ↓
I L

P	H	L
C	D	E
I/J	K	M

FC
↓ ↓
I T

T	B	C
F	G	I/J

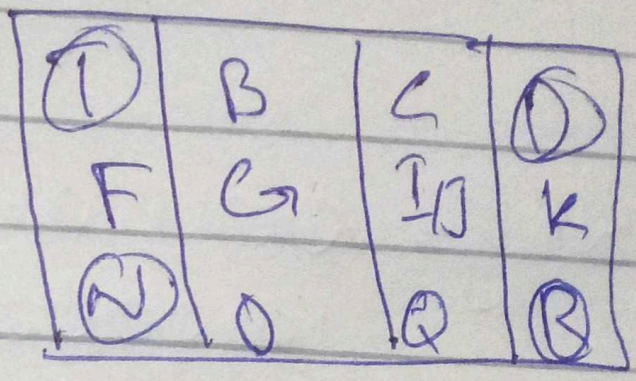
V K
↓ ↓
Y F

F	G	I/J	K
N	O	Q	B
V	W	X	T

Q N
↓ ↓
O U

N	O	Q	R	U

RT
ND



Decrypted Text is.

VULNERABILITY FOUND