Solution
Quiz-4

1.)Given,
My Roll number is = 2205025
Multiplier=Q=Last three digits of roll%5+6=025%5+6=6 (What is given M in the question)
Multiplicand=M=-11=10101, 2's of M=M^{2s}=01011

To multiply (-11 x 6)

Register	**Multiplier Register**		**Multiplicand Register**	**Operation**	**Remark**
A	**Q**	**Q_{-1}**	**M**		
00000	00110	0	10101	Initial configuration	
00000	00110	0		No Add/Sub	First Cycle
00000	00011	0		Shift	
01011	00011	0		A=A-M=A+M^{2S}	Second Cycle
00101	10001	1		Shift	
00101	10001	1		No Add/Sub	Third Cycle
00010	11000	1		Shift	
10111	11000	1		A=A+M	Fourth Cycle
11011	11100	0		Shift	
11011	11100	0		No Add/Sub	Fifth Cycle
11101	11110	0		Shift	

Result = Contains of AQ register = 11101 11110 = -66 (Answer of -11 x 6)

As multiplier will vary from (0+6) to (4+6) => from 6 to 10
So the last step (contains of AQ register) will be
-11 x 7 = -77 = 11101 10011
-11 x 8 = -88 = 11101 01000
-11 x 9 = -99 = 11100 11101
-11 x 10 = -110= 11100 10010
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2) Division operation using restoring Method (14 ÷ 3 = ?)

Dividend=Q=14=1110, Divisor=M=3=11

As length of dividend is 4 bit, So length of A and M should be (4+1)=5 bits.

So, A=00000 and M=00011 M^{2s}=11101

Steps	Sub-step	Step/Action	Accumulator (A)	Dividend (Q)	Divisor/Remarks (M)
0	0	Initial values	00000	1110	00011
First Cycle	a)	Shift left A,Q	00001	110_	
	b)	Perform A = A – M (A-Column)	11110	110_	A=A-M=A+M^{2s} A = 00001 M^{2s} = 11101 A = 11110
	c)	Now A is –ve, set q_0 = 0 (Q-column) and perform A=A+M (A-Column)	00001	1100	
Second Cycle	a)	Shift left A,Q	00011	100_	
	b)	Perform A = A – M (A-Column)	00000	100_	A=A-M=A+M^{2s} A = 00011 M^{2s} = 11101 A = 00000
	c)	Now A is +ve, set q_0 = 1 (Q-column)	00000	1001	
Third Cycle	a)	Shift left A,Q	00001	001_	
	b)	Perform A = A – M (A-Column)	11110	001_	A=A-M=A+M^{2s} A = 00001 M^{2s} = 11101 A = 11110
	c)	Now A is –ve, set q_0 = 0 (Q-column) and perform A=A+M (A-Column)	00001	0010	
Fourth Cycle	a)	Shift left A,Q	00010	010_	
	b)	Perform A = A – M (A-Column)	11111	010_	A=A-M=A+M^{2s} A = 00010 M^{2s} = 11101 A = 11111
	c)	Now A is –ve, set q_0 = 0 (Q-column) and perform A=A+M (A-Column)	00010	0100	

So Quotient is the contains of register Q=0100=4

And remainder is the contains of register A=00010=2

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Division operation using Non-Restoring Method (14 ÷ 3 = ?)

Dividend=Q=14=1110, Divisor=M=3=11

As length of dividend is 4 bit, So length of A and M should be (4+1)=5 bits.

So, A=00000 and M=00011 M^{2s}=11101

Steps	Sub-step	Step/Action	Accumulator (A)	Dividend (Q)	Divisor/Remarks (M)
0	0	Initial values	00000	1110	00011
First Cycle	a)	As sign of A is 0, so Shift left A, Q and do	00001	110_	
		Subtract (A=A-M)	11110	110_	A=A-M=A+M^{2s} A = 00001 M^{2s} = 11101 A = 11110
	b)	Set q_0=0 as sign of A is 1	11110	1100	
Second Cycle	a)	As sign of A is 1, so Shift left A, Q and do	11101	100_	
		Add (A=A+M)	00000	100_	A=A+M A = 11101 M = 00011 A = 00000
	b)	Set q_0=1 as sign of A is 0	00000	1001	
Third Cycle	a)	As sign of A is 0, so Shift left A, Q and do	00001	001_	
		Subtract (A=A-M)	11110	001_	A=A-M=A+M^{2s} A = 00001 M^{2s} = 11101 A = 11110
	b)	Set q_0=0 as sign of A is 1	11110	0010	
Fourth Cycle	a)	As sign of A is 1, so Shift left A, Q and do	11100	010_	
		Add (A=A+M)	11111	010_	A=A+M A = 11100 M = 00011 A = 11111
	b)	Set q_0=0 as sign of A is 1	11111	0100	

As the sign of A is 1, so do A=A+M=11111+00011=00010=2=Remainder
So Quotient is the contains of register Q=0100=4

3) Ans: The sequence of events involved in handling an IRQ:

- ✓ Devices raise an IRQ.
- ✓ The processor interrupts the program currently being executed.
- ✓ The device is informed that its request has been recognized and the device deactivates the request signal.
- ✓ The requested action is performed.

An interrupt is enabled and the interrupted program is resumed.