Question 4: IEEE Floating Point Arithmetic (8 marks)

Evaluate 40600000 – 3FA00000

Write down the numbers in binary format (1 mark)

```
40600000 = 0100 0000 0110 000…0
3FA00000 = 0011 1111 1010 000…0
```

1) sign bit: 0 (1 mark)

2)Take the subtrahend, shifting (2 marks)

Original Value: E: 01111111 M: 010...0

Shifted 1 place: E: 10000000 M: 1010...0 (Note: "1" is the hidden bit)

3) Add mantissa bits (2 marks)

```
  1.11000
 -0.101…00
  1.001
```

4) Normalize result: OK (1 mark)

5) Answer = 0 10000000 0010...0 = 40100000 (1 mark)

Question 5: IEEE Floating Point Arithmetic (8 marks)

Evaluate 416E0000 / 40880000

Write down the numbers in binary format (1 mark)

```
416E0000= 0 10000010 1101110 000…0
40880000= 0 10000001 0001000 …0
```

1) sign bit: 0 (1 mark)

2) Divide mantissa (2 marks)

```
       1.11
10001 | 11101.110
        10001
         11001
         10001
          10001
          10001
```

Answer = 1.11

3) Subtract exponents (2 marks)

```
10000010 – 10000001 + 01111111 = 10000000
```

4) Normalize result: OK (1 mark)

5) Answer = 0 10000000 110…0 = 40600000 (1 mark)