Solutions to exam in Optical Physics 111017

1-2
Each solution will be judged individually, there are many correct ones.

3
It should be 45° angle between them

4
In the Twyman Green both contributions to the pattern have one reflection and one transmission and therefore the two interfering intensities are equal and the modulation is one.

In the Mach Zender interferometer one contribution to the pattern is RI_{in} and the other $TI_{in} = (1-R) I_{in}$

$$I_{max} = RI_{in} + (1-R)I_{in} + 2\sqrt{R_{in}(1-R_{in})}I_{in} \text{ and } I_{min} = RI_{in} + (1-R)I_{in} - 2\sqrt{R(1-R)}I_{in}$$

We will then get

$$m_{max} = \frac{I_{max} - I_{min}}{I_{max} + I_{min}} = \frac{2\sqrt{R(1-R)}}{R+(1-R)} = 2\sqrt{R(1-R)}$$

5
Maximum modulation is of course = 1, while minimum is

$$m = \frac{2I - I}{2I + I} = 0.33$$

6

Narrow absorbing band

Broad absorbing band