



KEC

K Education Centre



AS Revision

Waves and Optics -1 marking scheme

Marking scheme

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Year 2021

	Guidance/Comments	Marks
Q1:	Using $n_1 \sin i = n_2 \sin r$ $r = \sin^{-1} (1.33 \sin 50 / 1.52) = 42.08$ degrees	3
Q2	Light of a single wavelength	1
Q3	Light that originates from a single source will be coherent/ will have constant phase difference.	2
Q4	Laser light is highly monochromatic. Because a laser beam is almost perfect parallel and monochromatic, a convex lens can focus it to a very fine spot. The beam power is then concentrated in a very small area. This why laser light is very dangerous if it enter the eye. Eye lens would focus the beam on a tiny spot on the retina and the intense concentration of light can destroy the retina. Precautions : Wear laser safety glasses, display warning signs, don't shine laser towards a person.	4
Q5	$W = \lambda D / S$, from here $D = 1.3 \times 10^{-3} \times 1 \times 10^{-3} / 530 \times 10^{-9} = 2.45$ m	2
Q6	Here are some points answer may include: <i>Signals can be degraded by absorption, which is where energy from the wave is absorbed by optical fibre. This leads to a reduction in amplitude of signal.</i> <i>Material dispersion is caused by different wavelengths of light travelling at different speed in material.</i> <i>Modal dispersion is caused by light rays entering at different angles, meaning that they take different paths along the fibre. This means that some light rays reach the end of fibre faster than others.</i>	6

Q7	Use $W_1 = D\lambda_1/S$ and $W_2 = D\lambda_2/S$ $W_1/W_2 = \lambda_1/\lambda_2$ $\lambda_2 = 7.2 \times 10^{-7}\text{m}$	4
Q8	Fringe width will decrease as $w = d\lambda/s$	2
Q9	a) Fringe width will decrease b) Fringe width will decrease c) Overlapping of fringes , interference pattern will not be distinct. d) Central fringe is white. Inner fringes are with blue or red colour.	8