Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Mark Schemes

Q1.

Question Number	Answer	Additional guidance	Mark
	substitution (1) $\frac{1}{f}=\frac{20+40}{20\times40}$ evaluation of $\frac{1}{f}$ (1) 0.075 evaluation of f (1) 13 (cm)	accept $\frac{1}{f}=\frac{60}{800}$ OR $\frac{1}{f}=\frac{3}{40}$ accept 13.3 (cm) 13.33 (cm) power of ten error on 13 gains 2 marks 0.075 on answer line gains 2 marks power of ten error on 0.075 gains 1 mark $\frac{40}{3}$ scores 2 marks award full marks for correct answer without working	**(3)** **AO2**

Downloaded from www.merit-minds.com

Q2.

	Answer	Additional guidance	Mark
(i)	W (1)	accept watt(s) J/s do **NOT** accept Ws W/s watt(s) per second	**(1)** **AO2**

	Answer	Additional guidance	Mark
(ii)	evaluation of K (1) $K = 1^{(2)} \times 1400$ substitution (1) (intensity =) $\frac{1400}{2.4^2}$ evaluation (1) 240 (W/m^2)	 1400 accept for one mark intensity = $\frac{K}{2.4^2}$ allow numbers that round to 240 e.g. 243.05 accept answers in terms of ratios award full marks for correct answer without working.	**(3)** **AO2**

Downloaded from www.merit-minds.com

Q3.

Question number	Answer	Additional guidance	Marks
(i)	Accept any answer between 502 and 510 nm inclusive		1

Question number	Answer	Additional guidance	Marks
(ii)	Substitution (1) frequency = $3.0 \times 10^{8} / (505 \times 10^{-9})$ Evaluation (1) $=5.9 \times 10^{14}$ Unit mark (1) Hz	 accept answers in range 5.88×10^{14} to 5.98×10^{14} Accept hertz / s^{-1}	(3)

Question number	Answer	Additional guidance	Marks
(iii)	An answer that combines three points of interpretation/evaluation to provide a logical description (3) Yellow or green or blue detected/seen the best/most sensitive to / highest relative sensitivity (1) Red or orange not detected/not seen (so well)/least sensitive to/lowest relative sensitivity (1) violet or indigo not detected/not seen (so well)/less sensitive to (1)	 about 500 nm more than 550 nm less than 450 nm 2 max if only wavelength instead of colours	(3)

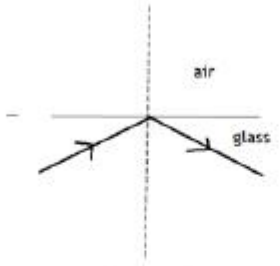
Downloaded from www.merit-minds.com

Q4.

Question Number	Answer	Mark
	B frequency increases ***A*** *is not correct because the danger does not increase with decreasing frequency* ***C*** *is not correct because all waves in the e-m spectrum have the same velocity* ***D*** *is not correct because all waves in the e-m spectrum have the same velocity*	**(1)** **AO1**

Downloaded from www.merit-minds.com

Q5.

Qustion Number	Answer	Mark
	B  **Once DTP redraw image, crop and insert here.** ***A*** *is not correct because the angle of incidence is not equal to the angle of reflection* ***C*** *is not correct because glass is more optically dense than air* ***D*** *is not correct because glass is more optically dense than air*	**(1)** **AO1**

Downloaded from www.merit-minds.com

Q6.

Question Number	Answer	Mark
	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO1 strand 1 (6 marks)** • radio waves are (often) produced intentionally (by humans) • gamma rays are (often) produced spontaneously / randomly • radio waves are produced by (free) electrons • radio waves are produced by oscillating (free) electrons / alternating current (ac) • radio waves are produced in electrical circuits / aerials • gamma rays may result from radioactive decay • gamma rays produced in the nucleus • gamma rays produced by energy changes / rearrangement in the nucleus • gamma rays produced to stabilise the nucleus • gamma rays produced in annihilations (PET scanning etc) • gamma rays may be produced as a result of (nuclear) fission or fusion	**(6)**

Downloaded from www.merit-minds.com

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Downloaded from www.merit-minds.com

Summary for guidance			
Level	**Mark**	**Additional Guidance**	**General additional guidance – the decision within levels** e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	Additional guidance isolated fact(s) about one radiation	Possible candidate responses gamma rays are (often) produced spontaneously / randomly
Level 2	3–4	Additional guidance Some understanding shown i.e. a limited comparison made including some facts about the production of each radiation OR more detailed facts given about the production of one of them	Possible candidate responses radio waves produced in wires and gamma produced in nucleus radio waves produced by AC in wires
Level 3	5–6	Additional guidance Understanding is detailed and fully developed. detailed comparison made with linked facts about the production of each (one radiation may have significantly more detail than the other but both should feature for level 3)	Possible candidate responses radio waves produced by electrons oscillating in wires; gamma produced by annihilation of electrons interacting with positrons

Downloaded from www.merit-minds.com