Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Mark Schemes

Q1.

Question Number	Answer	Additional guidance	Mark
	An explanation that includes any three of the following points :- ground is charged (by induction) (1) charge on ground is positive (1) electric field builds up (between cloud and ground) (1) air is ionised (1) electrons travel to the ground/positive ions travel to the cloud (1)	May be seen on diagram Award two marks for 'the ground is positively charged' allow electric charge or voltage or potential difference for electric field air becomes a conductor allow charge for ions	**(3)**

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Q2.

Question Number	Answer	Additional guidance	Mark
(i)	An explanation that combines:- rub the rod with a cloth (1) (so)electrons (1) are moved (from rod to cloth) (1)	 allow clean off the rod or friction (with the rod) allow negative charges for electrons movement of positive charges can only score the first mark 'electrons are positive' can score a maximum of one mark movement of unnamed charges can score third mark	(3)

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Question Number	Answer	Mark
(ii)	**B** R 	(1)

B is the only correct answer.

A is incorrect because ball Q is coated with a conducting material but is uncharged, a negative charge will be induced on it and it will be attracted not repelled by a positively charged rod.

C is incorrect because ball S is an insulator and is uncharged and will not be repelled by a positively charged rod.

D is incorrect because ball T has a negative charge and will be attracted not repelled by a positively charged rod.

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Q3.

Question number	Answer	Additional guidance	Mark
	An explanation that combines identification – knowledge (1 mark) and reasoning/justification – understanding (2 marks): • use of a conductor to connect between aircraft and ground (1) • allowing negative charge to move onto the aircraft (1) • therefore neutralising the positive charge(s) (1)	accept (copper) wire accept earth for ground	**(3)**

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Q4.

Question number	Indicative content	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. **AO2 (strand 2) (6 marks)** 1. rub a strip with the cloth 2. test to see its charge (positive or negative) by rubbing against the coulombmeter 3. place the strip in the holder 4. charge another strip by friction (rubbing) 5. test its charge with the meter 6. bring the second strip up towards the one in the holder; either attracts or repels 7. repeat 1-6 with another charged strip 8. repeat steps 1-3, but then charge an acetate strip, again detecting the sign of its charge, as before 9. bring the charged acetate (+) strip up to the charged polythene (-) strip; the one in the stirrup should now be attracted / move towards the other	**(6) AO2**

AO targeting: 6 marks AO2 strand 2

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Level	Mark	Descriptor
	0	• No awardable content
Level 1	1-2	• The explanation attempts to link and apply knowledge and understanding of scientific enquiry, techniques and procedures, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear. (AO2)
Level 2	3-4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, some logical connections made between elements in the context of the question. • Lines of reasoning mostly supported through the application of relevant evidence. (AO2)
Level 3	5-6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, logical connections made between elements in the context of the question. • Lines of reasoning are supported by sustained application of relevant evidence. (AO2)

Summary for guidance

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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 A limited explanation with at least two steps of a suitable procedure	Possible candidate responses rub a strip with the cloth / give it a charge place the strip in the holder explains consequent attraction / repulsion
Level 2	3–4	Additional guidance Partially complete explanation of a suitable procedure with at least three steps and some purpose indicated	Possible candidate responses As above with bring a second strip up towards the one in the holder either attracts or repels repeated with like / unlike charges use of coulombmeter
Level 3	5–6	Additional guidance Detailed explanation of a suitable procedure with most steps and a clear logic in what is being proposed	Possible candidate responses As above with test charge with the meter to see if it's (+) or (-) detailed use of acetate / polythene strips with purpose

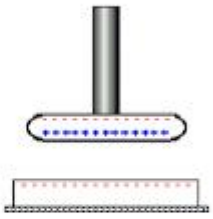
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Q5.

Question	Answer	Additional guidance	Mark
	an explanation linking any **two** from: balloon attracted (1) (by) negative charges/electrons (at surface) on wall (1) idea of charge separation in wall (1)	 ignore 'sticks/attaches to the wall' as in stem may be drawn on Figure 6 eg minus signs induced charges (in wall) may be drawn on Figure 6	**(2)** **AO1.1**

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Q6.

Question number	Answer	Additional guidance	Mark
(i)	B  A and D are incorrect because a negative charge cannot induce a negative charge C is incorrect because the disc is insulated so negative charge cannot be removed		(1)

Question number	Answer	Additional guidance	Mark
(ii)	an explanation linking: electrons / negative charges have flowed (1) from the metal disc / to the student / to earth/ground (1)	 reject positive charge moving for first mark	(2)

Question number	Answer	Additional guidance	Mark
(iii)	at least three straight lines joining disc and plastic (1) arrow(s) from disc towards plastic (1)	judge by eye ignore curved lines at edge do not award mark if there are arrows in both directions	(2)

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