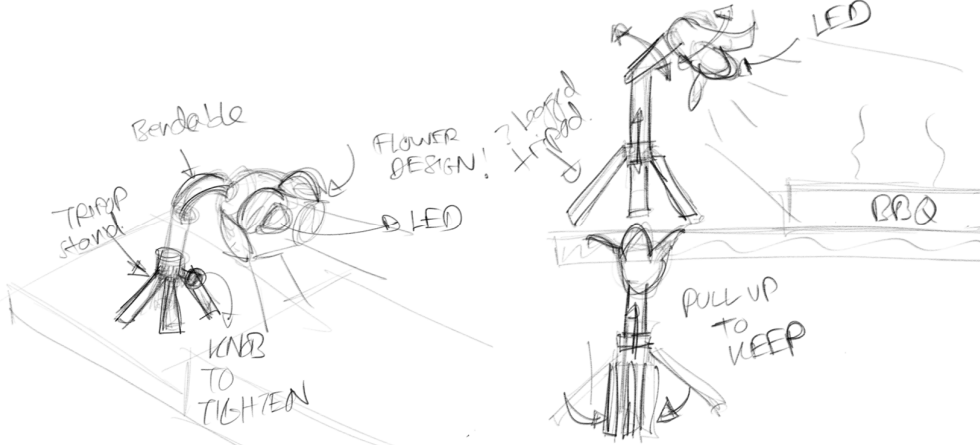
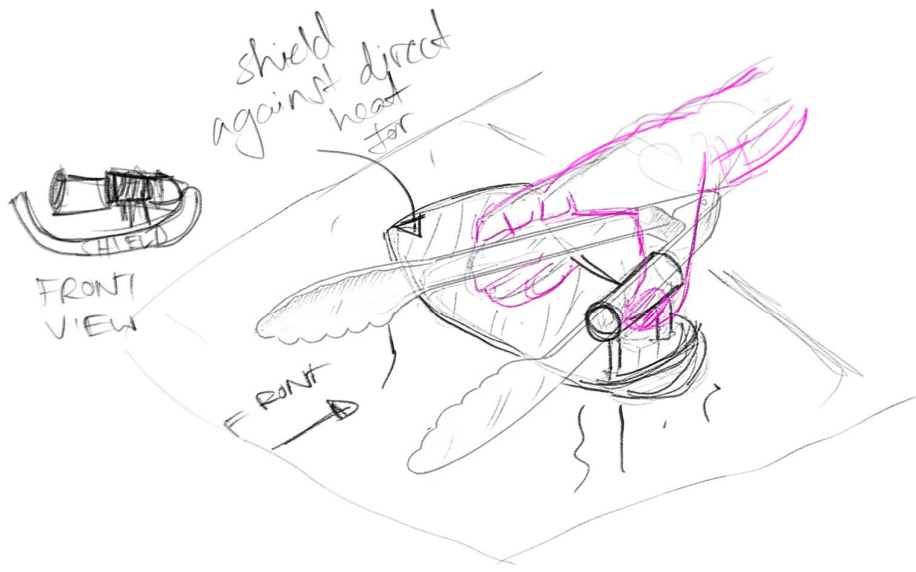
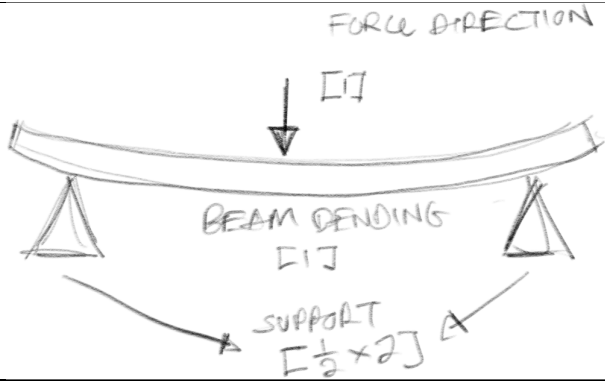
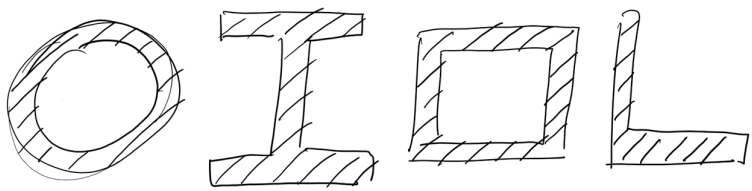
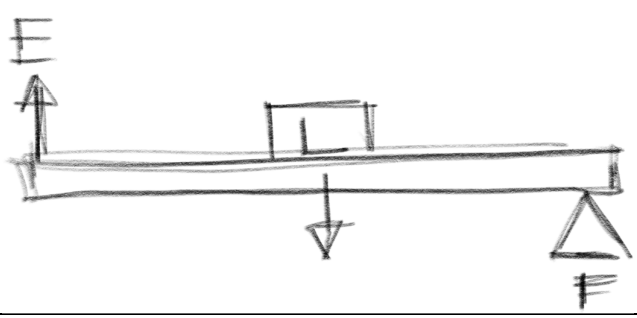
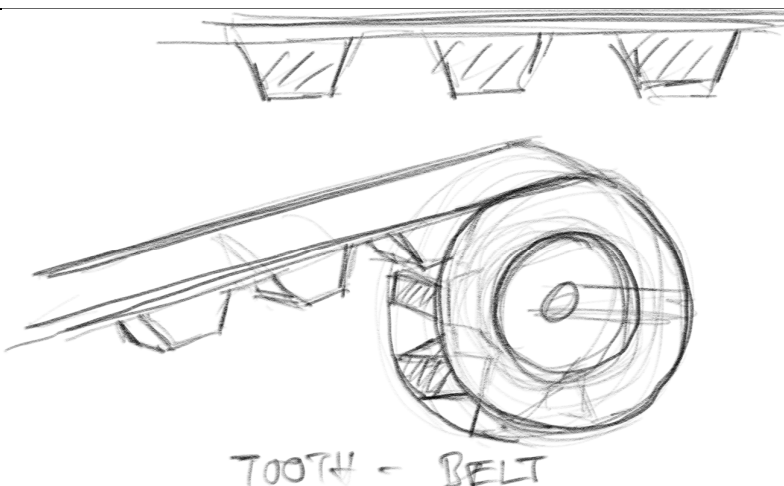
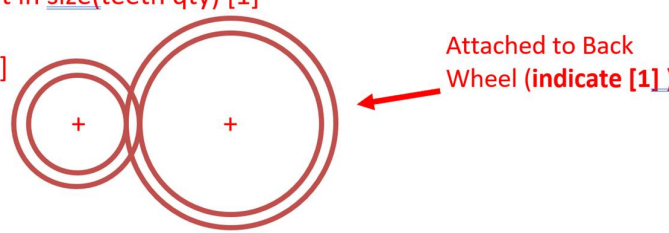


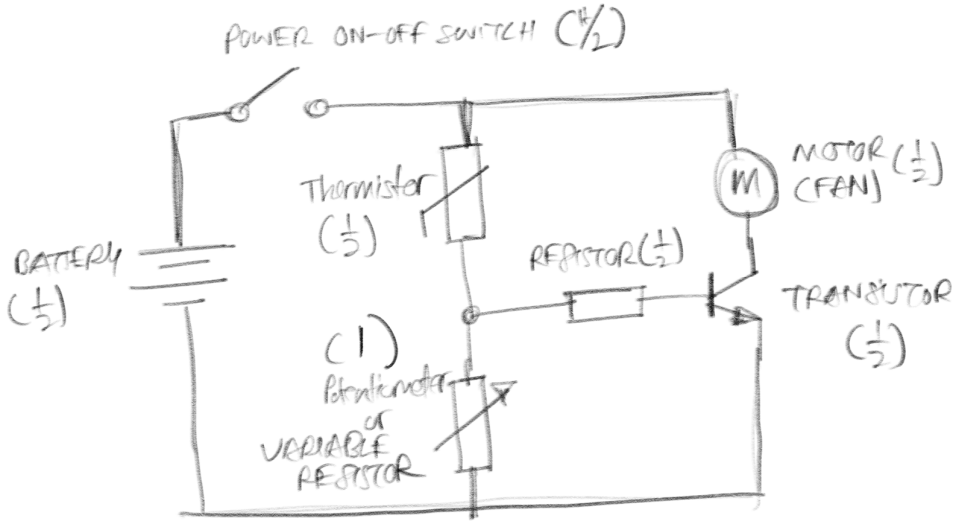
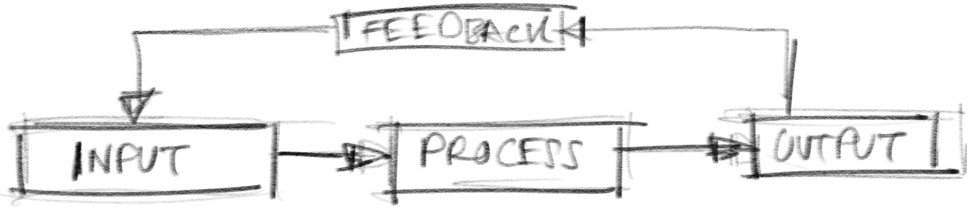
Qns	Answer and marking description	Marks
1a	Design and make a portable lamp [0.5] to be placed on the table beside the BBQ pit [0.5] for BBQ-pit users [0.5] to check / see if their food is fully cooked [0.5]	2
1b	Observe BBQ-pit users [1] and document [1] their actions, habits, difficulties etc [1] (or) Observe environment around BBQ-pit [1] to find out surrounding conditions [1] with documentation (record down) [1]	3
1c	Sustainability is crucial for designers because it ensures that products are... environmentally friendly / reduce waste / conserve resources / minimizes environmental impact of manufacturing / minimizes environmental impact of disposal/ promotes long-term durability / and efficiency / economically viable/ influence users to be socially responsible. Any two points from the above or any other suitable answers	2
1d	- the product should be made of fire-resistant material [1] so that it can withstand prolonged exposure to heat [1]. - the product should be lightweight [1] so that it is convenient for transportation [1].	2
1e	 Clarity and Proportion [2] Feasibility [1] Interesting design (shape) [1] Light can illuminate large area of BBQ pit [1] Portability [1]	

1f	Clarity and Proportion [3] Protect hand from heat [1] 	4
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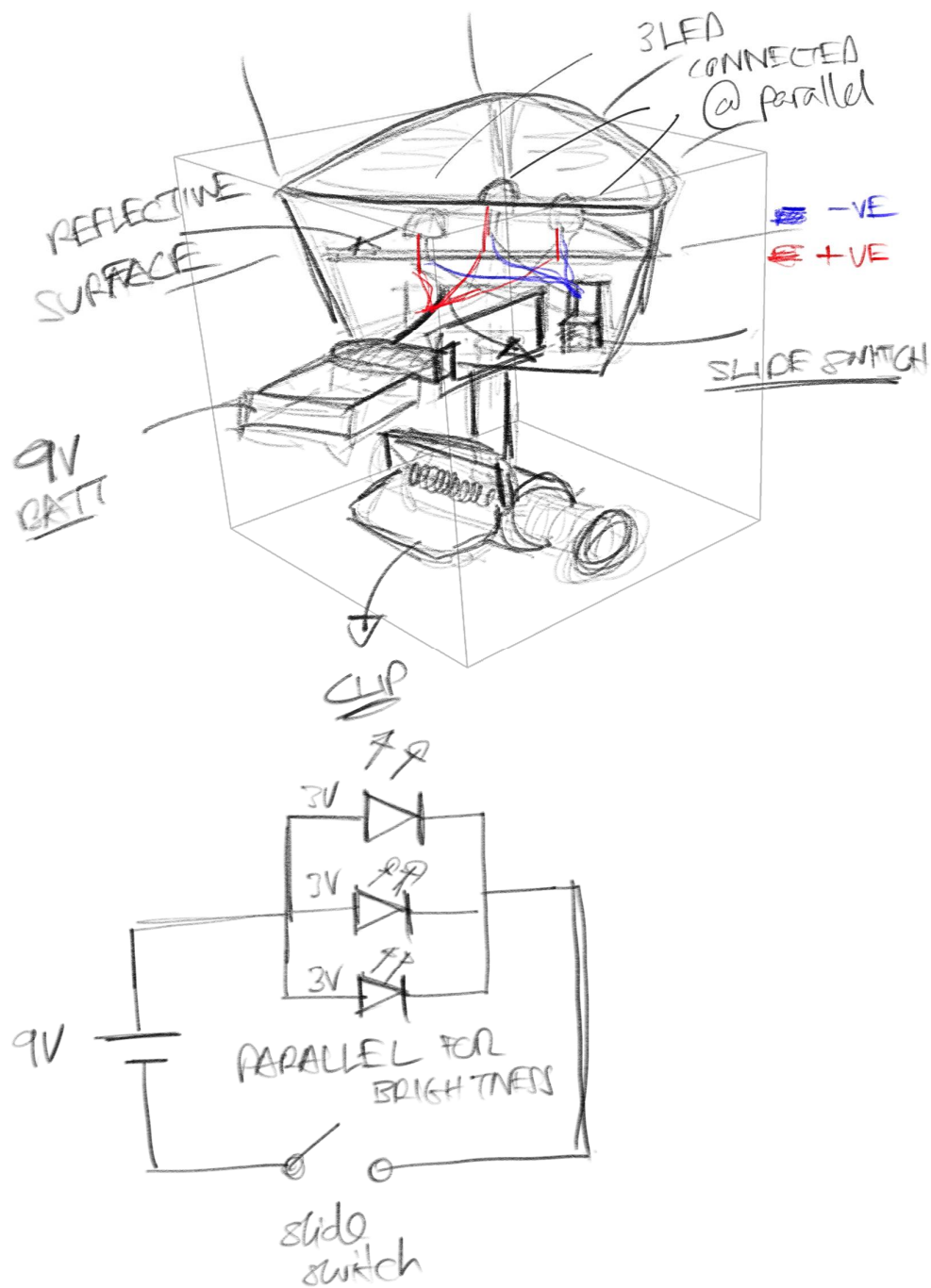
1g	Sketch of anthropometric hand part [1] Related anthropometric dimensions use [1] linked to parts of the design [1]	3
1h	The study of the design of products so that people/user can interact [1] with them in a comfortable, safe and efficient way [any 2 x ½]	2
1i	Analyse product prototype against (Need / Brief) [½] / Specifications [1] to confirm if prototype works accordingly / check for improvements [1] (or) any evaluation methods eg. PMI, SWOT etc, with some explanation.	2
2a	Shell structure	1
2b	Contain [1] – The wooden wardrobe contains / holds the clothings inside [1] to be at 1 location. Protect [1] – The wooden wardrobe protects the clothings from dust / direct light shine [1]	4
2ci	Bending	1
2cii	Simply Supported [1] beam	1
2ciii		3

		
2civ	Sheet materials made stronger [1] by joining/gluing several pieces together [1]	2
2cv	 Any suitable cross section [1] clarity of sketch [1]	2
2cvi	Appropriate reinforcement [0, 1, 2] - e.g. braces, gusset plates, webbing etc - Correct name [0, 1] - Clarity [1]	4
3ai	2 nd Class lever	1
3aii	Load (L) is in middle [1] Fulcrum and Effort indicated [1] Direction of forces [½] x2 	3
3aiii	Ball bearing for Speed/smooth rotation [1], so that wheelbarrow can move easily [1]	2

	(or) Any suitable explanation with reason.	
3bi	Mechanism A : Chain Mechanism B: Sprocket	2
3bii	Rotary [1] (input - pedalling) to Linear [1] (output – bicycle move forward)	2
3biii	Bicycle needs to move heavy load (user + internal weight) [1] , but the (Flat) belt in Fig. 3.3 will slip (<i>pulley rotate, belt no move</i>) under heavy load [1] ** <i>Belt will slip off the pulley easily [1]</i> (or) Any suitable explanation with reason.	2
3biv	 TOOTH - BELT 2D or 3D Sketch clarity [1] Any viable belt that increases grip/surface area contact [1]	2
3ci	2 gears visibly different in <u>size</u>(teeth qty) [1] Gears look engaged [1]  Attached to Back Wheel (<u>indicate [1]</u>)	3
3cii	The output/back wheel is attached to a bigger/more teeth gear [1] than the input gear to achieve a slower rotation speed (or) Any suitable explanation with reason.	1
4a	<u>Sensing Circuit CONNECTION</u> Cannot make out connection [0] / Partial Correct [1] / Fully Correct [2]	6

	* Above [] refer: give the respective [½] for correct components' names ; except Potentiometer/Variable resistor is [1] 	
4bi	Closed Loop Control System [1]	1
4bii	Corresponding to answer in 4b)i. [1] (i.e. if answer "Open-Loop" in above, then the diagram should be "Open-Loop" * 3 / 4 stages all correct [1] 	2
4c	Single-use batteries disposed after the current runs out [1] may cause pollution to environment [1] / need new raw resources to make new ones [1] (deplete natural resources) / rechargeable batteries more sustainable [1], etc (or) Any suitable explanation with reason.	2
4di	555 [1] (timer IC chip)	1
4dii	4026 is used to drive / make the 7-segment LED [½] to display numeric digits (numbers) [1] in ascending order [½].	2
4e	3 x LEDs [1] ; connected in parallel [1] Switch is SLIDE SWITCH [1]	4

battery indicated as 9V [1]



** If draw circuit symbol instead of physical component, can [½] each if is correct **

END OF PAPER