

Cambridge Technicals Engineering

Unit 2: Application of engineering principles

Level 2 Cambridge Technical Certificate/Diploma in Engineering
05887 - 05888

Mark Scheme for January 2021

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Question		Answer	Marks	Guidance
1	(a)	The efficiency will decrease.	1	
	(b)	Work done = force x distance = 40 x 8 = 320 Nm	2	Award 1 mark for Work done = force x distance OR 40 x 8 320 Nm scores 2 marks (320 without unit scores 1)
	(c)	Input power = output power/efficiency = 120/0.75 = 160 W	3	Award 1 mark for Input power = output power/efficiency OR 120/0.75 160 scores 2 marks Award 1 mark for unit W.
	(d)	$N = 60 P / 2T\pi$ $= (60 \times 120) / (2 \times 30 \times \pi)$ $= 38.2 \text{ rev/min}$	3	Award 1 mark for $(60 \times 120) / (2 \times 30 \times \pi)$ 38.2 scores 2 marks Award 1 mark for unit rev/min.

Question		Answer	Marks	Guidance
2	(a)	Property: Hardness Machinability or toughness (allow durable) Heat resistant	3	Award 1 mark for each correct response.
	(b)	Benefits: Low cost Reusable Recyclable Drawback: Not renewable	3	Award 1 mark for each correct response up to a maximum of 2 marks for benefits and 1 for drawback. Accept other correct responses.
	(c)	Manipulation and forming techniques: Injection moulding Extrusion Vacuum forming Forging Folding Bending Laminating Cast moulding	3	Award 1 mark for each correct response up to a maximum of 3.
	(d)	(i) Rusting (ii) Rapid prototyping (iii) Welding	3	Award 1 mark for each correct response.

Question		Answer	Marks	Guidance
	(b)	With the circuit de-energized, connect the test leads across the component being tested.(1) Insert the black test lead into the COM terminal and the red lead into the V Ω terminal.(1) Turn the dial to Continuity Test mode and If required, press the continuity button. (1)	3	Award 1 mark for each correct point made up to a maximum of 3.
	(c)	Safety precautions: Work in a dry area Disconnect the power source before testing the electronic circuit Only use tools and equipment with non-conducting handles Wear protective clothing e.g. insulated gloves Do not wear jewellery that is made from a conductive material If sensible to do so, try and keep one of your hands behind your back	3	Award 1 mark for each correct safety precaution up to a maximum of 3. Accept other correct responses.

Question		Answer	Marks	Guidance
4	(a)	<p>A rotary positive-displacement pneumatic power supply is a pump that consists of vanes mounted to a rotor that rotates inside a large circular cavity. (1)</p> <p>The vanes slide in and out of the rotor, which seals all of the edges. The vane chambers are now ready to do the pumping work. (1)</p> <p>On the intake side of the pump, the vane chambers are increasing in volume. The increased volume vane chambers are now filled with fluid forced in by the inlet pressure. (1)</p> <p>On the discharge side of the pump, the vane chambers are decreasing in volume, forcing fluid out of the pump. The action of the vane drives out the same volume of fluid with each rotation. (1)</p> <p>Applications:</p> <p>Coffee machines Superchargers Power steering Air conditioning Automatic transmission Air injection</p>	6	<p>Award 1 mark for each correct explanation point up to a maximum of 4.</p> <p>Award 1 mark for each correct application up to a maximum of 2.</p> <p>Accept other correct responses.</p>
4	(b)	<p>(i) Single acting cylinder (ii) Double acting cylinder</p>	2	Award 1 mark for each correct response.
4	(c)	<p>Poppet valve Check valve Spool valve Pilot valve</p>	4	Award 1 mark for each correct valve.

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