Cambridge Technicals

Engineering

Unit 2C: Application of engineering principles

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

Mark Scheme for June 2024

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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.

Question			Answer	Marks	Guidance
1	(a)		Any four from the following losses: • Wear and tear • Friction • Noise/sound • Vibration/movement • Thermal/heat	**4** (4x1)	
1	(b)		Efficiency = output power/input power (1) x 100% = 40/80 (1) x 100% = 50% (1)	**3** (1x3)	Award 3 marks for a correct answer with no working.
1	(c)		Work done = force (1) **x** distance (1) or distance (1) **x** force (1)	**2** (1x2)	Do not allow something <u>divided</u> by force or distance

Question			Answer	Marks	Guidance
2	(a)		Ferrous Materials: • Cast Iron (1) • Stainless Steel (1) • High Speed Steel (1) Thermoplastic Materials: • High Impact Polystyrene (1) • Nylon (1) • Polycarbonate (1)	**6** (6x1)	Only accept three materials for each category. If a material is entered into both lists no marks awarded.
2	(b)		Joining methods: • Threading/screwing • Soldering/solder • Welding/weld • Adhesive Bonding/Glueing	**3** (3x1)	Do not allow melting
2	(c)		Galvanising The process of applying a protective (1) zinc coating (1) to a ferrous material (1). The ferrous material is immersed in molten zinc (1).	**3** (1x3)	

Question			Answer	Marks	Guidance
3	**(a)**		Value - **4,700** or **4700 Ω** or **4.7 kΩ** or **4K7** (1) Tolerance percentage is 5 or 5% (1)	**2** (1x2)	 Accept ± 235 Ω for tolerance
3	**(b)**	**(i)**	Components: **A** Single Pole Single Throw switch (1) **B** Fixed Resistor or Resistor (1) **C** Capacitor (1)	**3** (3x1)	Accept 'switch' or 'open switch'
3	**(b)**	**(ii)**	Description of purpose: **A** Single Pole Single Throw switch – to open (1) or close a circuit (1) **B** Fixed Resistor or Resistor – to limit/prevent/resist/decrease/stops/regulate (1) the flow of current/charge (1) in a circuit. **C** Capacitor – to store (1) electrical energy (1)	**6** (3x2)	Award 2 marks for 'on-off switch
3	**(c)**		Solid core cable – Household wiring/circuit boards/jump leads (1)	**1**	Accept other correct responses

Question			Answer	Marks	Guidance
4	(a)	(i)	A double acting cylinder is powered by air/fluid in both directions, on the outstroke (1) and on the instroke (1). A single acting cylinder is powered by air/fluid on the outstroke (1) and a return spring on the instroke (1)	**3** (1x3)	Award one mark for each correct statement made.
4	(a)	(ii)	Rotary A rotary actuator has a vane which is attached to a central spindle. (1) Compressed air pushes against the vane which turns the spindle. (1) The air 'behind' the vane is released through a port. (1)	**3** (1x3)	Award one mark for each correct statement made.

Question			Answer	Marks	Guidance
4	(a)	(iii)	Linear single acting cylinder applications: • Clamping • Punching • Positioning • Car hoist • Car jack • Rams • Dump truck • Excavator Rotary actuator applications: • Clamping • Positioning • Pick and place • Robotics • Medical devices • Transferring parts	**4** (4x1)	Accept other correct responses for both actuators.
4	(b)		air (1) fluid (1)	**2** (2x1)	

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