OCR
RECOGNISING ACHIEVEMENT

GCE

Design & Technology

Advanced GCE **A2 7822-3**

Mark Schemes for the Units

January 2010

7822-3/MS/R/10J

Oxford Cambridge and RSA Examinations

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MARK SCHEMES FOR THE UNITS

2524/01 Product Design 2

1 Fig 1 shows a desk used in schools. The desk has a metal frame. The desk is made from manufactured board with a plastic laminate surface.

(a) (i) Give **two** reasons why a manufactured board is suitable material for this desk top.

eg
- Large board size
- Less waste
- Consistent properties.

2 x 1 mark [2]

(ii) Name **two** manufactured board that could be used to make the desk top.

eg
- Plywood
- MDF
- Chipboard
- Hardboard.

2 x 1 mark [2]

(iii) Describe **two** ways in which the top of the desk could be attached to the frame. Use sketches where appropriate.

eg
- Screwed in through frame to underside
- Use of bracket
- Use of block fixing.

1 mark for method
1 mark for description

2 x 2 mark [4]

(b) (i) Describe how the plastic laminate is fixed to the board surface during manufacture. Use sketches where appropriate.

- Roll/sheet of laminate
- Suitable adhesive applied
- Pressure application
- Roller.

4 x 1 mark [4]

(ii) Describe how the edges of the desk top would be finished. Use sketches where appropriate.

eg
- Laminate trimmed by router
- Edge rounded
- Edge painted
- Wood/laminate trim attached to edge.

4 x 1 mark [4]

(c) Discuss the implications to the manufacturer of using manufactured board in the production of furniture.

- The ease of using uniform board
- Resins in board can affect tooling
- Dust control
- Difficulty in recycling/reusing waste.

Explanations (3)
Examples given (2)
Points raised (3)

[8]

Total: [24]

2 Fig 2 shows a tubular bicycle frame.

(a) (i) **Two** specific metals named

eg
- Steel
- Aluminium
- Titanium.

2 x 1 mark [2]

(ii) Name two finishes applied to tubular bicycle frames.

eg
- Powder Coated
- Electrostatic spraying
- Paint spraying.

2 x 1 mark [2]

(iii) Describe two different forces that act within a bicycle frame when it is in use. Use sketches where appropriate.

eg
- Compression
- Tension
- Torsion.

1 mark for identifying force 1 for correct description

2 x 2 mark [4]

(b) (i) Describe how the frame would be finished using an electro-static applied coating. Use sketches where appropriate.

eg
- Frame cleaned/pickled
- Primed
- Paint chamber
- Positive charge
- Negative charge
- Suspension of part in chamber.

4 x 1 mark [4]

(ii) Describe how the manufacturer would check that the frame is aligned correctly during the manufacturing process.

eg
- Alignment jig
- Visual checks
- Template gauge.

1 mark for method 1 mark for description

2 x 2 mark [4]

(c) Discuss the implications of using modern materials for high performance sports equipment.

eg
- Expectations of users
- Development through sports science
- Use of new materials developed for other programs (space science)
- Commercial sponsorship enabling more expensive materials to be used
- Continual R&D programs have to be considered.

Points raised (3)
Explanations (3)
Examples given (2)

[8]

Total: [24]

3 Fig. 3 shows a standard 13 Amp plug.

(a) (i) Give **four** reasons why thermosetting plastics are suitable for making 13 Amp plugs.

eg
- High impact resistant
- Heat resistant
- Can be readily formed into shape
- Integral screw threads can be easily formed
- Electrical resistance properties.

4 x 1 mark [4]

(ii) Additives can change the characteristics and properties of plastics. Give four changes that can be achieved by using additives with plastics.

eg
- Electrical properties
- Impact resistant
- Aging resistance
- Colouring
- Thermal properties
- Moulding properties.

4 x 1 mark [4]

(b) The cover of the 13 Amp plug shown in Fig. 3 is made by compression moulding. Describe the process of compression moulding the plug cover, including the most important features of the mould. Use sketches where appropriate.

eg
- Slug/measured quantity of plastic
- Preheat
- Hydraulic pressure
- Spilt mould
- Heating and use of pressure to cure
- Curing time
- Mould cooling
- Mould release
- Ejection
- Flash
- Flash cleaning.

8 x 1 mark [8]

(c) Discuss the implications of ensuring the safety of consumers using main voltage domestic appliances.

- Health and safety legislation for consumers
- Constant product testing
- Need to recall products if found to be faulty
- Double insulation of mains parts
- Suitable fusing
- Warning indicators to let users know it's switched on.

Points raised (3)
Explanations (3)
Examples given (2)

[8]

Total: [24]

4 Fig. 4 shows a carton designed to hold fruit juice.

(a) (i) Give **two** reasons why laminated paperboard is a suitable material for fruit juice cartons.

eg
- Easy to print onto
- Waterproof
- Lightweight material
- Safer than glass containers
- Hygienic
- Good strength to weight ratio
- Can be collapsed after use for disposal.

2 x 1 mark [2]

(ii) State **two** methods used to show if cartons have been tampered with prior to opening.

eg
- Internal plastic seal
- Peel-able foil or plastic film
- Snap seals on lid/collar.

2 x 1 mark [2]

(iii) Laminated paperboard consists of several layers. Identify and explain the function of **two** of them. Use sketches where appropriate.

eg
- Laminate/plastic surface
- Paperboard
- Foil/aluminium layer
- Internal laminate layer.

Layer identified 1 mark
Purpose of layer 1 mark

2 x 2 mark [4]

(b) (i) Draw a net of the carton shown in Fig. 4

eg
- Net works
- Folds correctly shown to enable top to be formed
- Reinforced base formed
- Plastic insert hole located correctly
- Folds correctly shown to form base.

Full net to be shown in final mark scheme

4 x 1 mark [4]

(ii) Describe the press form that would be used to manufacture the cartons. Use sketches where appropriate.

eg
- Folding/creasing bars
- Cutting bars
- Foam protection on blades
- Suitable backing board
- Indication of correct net shown.

4 x 1 mark [4]

(c) Discuss the implications of replacing glass bottles with laminated board cartons for packaging liquids.

eg
- Lighter in weight to carry
- Less energy used in production
- Less risk of breakages
- Difficulty recycling not re-using
- Can be crushed prior to disposal
- Shape of cartons tend to lend to easier storage.

Points raised (3)
Explanations (3)
Examples given (2)

4 x 1 mark [4]

[8]

Total: [24]

5 Fig 5 shows an event ticket with a printed hologram.

(a) (i) Name **two** other products that have holographic images printed on them.

eg
- Money
- DVD's etc
- Bank/Identity Cards.

2 x 1 mark [2]

(ii) Give **two** reasons, other than security, why holographic images are used.

- Dynamic action given to ticket
- Corporate identity
- Quality 'feel' to ticket.

2 x 1 mark [2]

(iii) Give **four** examples of security measures, other than holographic images, that could be used on a ticket.

eg
- Watermarks
- Complex design
- Serial Numbers
- Embedded security strips
- Barcode.

4 x 1 mark [4]

(b) (i) Stamp perforation or roller perforation process equally valid
eg
- Perforation roller
- Top roller
- Under roller
- Cross rolled
- Perforation stamp
- Cut bar shown if required
- Under frog
- Card feed roller

4 x 1 mark [4]

(ii) Description of offset lithographic printing

Eg

- Top roller
- Ink reservoir
- Colour rollers
- Feed roller

4 x 1 mark [4]

(c) Discuss the implications for manufacturers involved within the printing industry to the widespread development of ICT.

Discussion could include:
eg

- Security of design
- More complex designs to prevent copying
- In-built security to online images to prevent download
- More people doing own printing
- Ease of moving copy no need for hard copies or proofs
- Instant download of images.

Points raised (3)
Explanations (3)
Examples given (2)

[8]

Total: [24]

6 Fig 6 shows a bag made using decorative weave (eg jacquard fabric).

(a) (i) Name two pre-manufactured standard components used to make the bag shown in Fig.6.

Any two, one mark each:
- Cord/yarn for handle
- Thread
- Tassel
- Bead
- Zip.

[2]

(ii) Name one fibre that could be used to make the decorative weave fabric used for the bag, giving one reason for your choice.

- One mark for name of fibre, one for reason
- Silk – smooth/silky/lustrous/shiny/
- Polyamide/nylon – same quantities as silk but cheaper
- Polyester – same qualities as silk but much cheaper.

[2]

(iii) Describe how the pattern is created in a decorative weave fabric.
Use sketches where appropriate.

- Made on a loom
- Warp thread runs up and down the fabric
- Weft goes across
- Warp threads individually to create pattern
- Use of punch card/electronic control/CAM
- Coloured weft threads inserted
- Weft may not travel all the way across the fabric if colour change needed.

[4]

(b) Describe the order of manufacture of the bag shown in Fig. 6. Use sketches where appropriate.

Any eight points in a logical order:

- Correct shaped patterns pieces shown
- Markings shown on pattern pieces, eg straight grain, notched, names and number to cut
- Pin on and cut out – mention of aligning straight grain
- Insert zips into front pocket – sew lower edge, top and side seams
- Neaten seams/overlock
- Turn right side out
- Attach front pocket to front section of main bag
- Construct main bag – sew lower edge, top and side seams
- Remember to insert cord handle into side seams at the top
- Neaten seams
- Attach tassel to zip
- Quality checks.

[8]

(c) Discuss the implications of using CAD/CAM in the design and manufacture of decorative fabrics.

- Increased accuracy of designs/products
- Versatility of software
- Saving designs
- Easy modification
- Colourways
- Map onto products
- E-mail to clients for feedback
- Direct link to manufacturing machines
- Speed of working, adapt to changing fashions
- Improved quality
- Loss of jobs
- Cost of machinery
- Training of staff
- Longer running times for machines/less supervision needed.

Range and relevance of issues relating to the question [3]
Quality of the reasoning and explanation [3]
Suitable use of examples and evidence to support the discussion [2]

[8]

Total: [24]

7 Fig. 7 shows a gilet made from a quilted fabric.

(a) (i) Name four performance characteristics needed by the fabric used for the outer layer of the gilet.

Any four, one mark each:
- Water/stain repellent
- Hardwearing/durable
- Washable
- Good texture
- Anti-static
- Stable fabric to quilt.

[4]

(ii) The fabric used for the outer layer of the gilet has been coloured using a batch dyeing process. Describe how this would be done in industry. Use sketches where appropriate.

Any four points, one mark each:
- Self contained machine for process
- Large quantity of fabric dyed at once – known weight
- Dye stuffs/chemicals added in carefully measured amounts
- Fixer added in set amount – same machine or separate process
- Temperature controlled
- Set amount of time for process
- Fabric passed through dye bath for even colour distribution.

Awaiting illustration

[4]

(b) Describe the order of work for quilting the fabric for the gilet.
Use sketches where appropriate.

- Quilt fabric before cutting to shape of garment
- Cut fabrics to same sizes
- Place three layers together – wadding in the middle with the inner and outer fabrics right sides facing outwards
- All fabrics must be smooth and flat
- Pin and tack together – start in centre and work outwards
- March stitching lines – use quilting foot attachment
- Longer stitch on the machine
- Possibly loosen tension
- Dual feed/walking foot to help fabric through
- Start stitching in centre and work outwards
- Remove tacking
- Cut loose threads
- Press lightly

Quality checks – may be done during process not left to the end:

- Check fabrics flat – no tucks or creases
- Quality of stitching – correct tension/even length/no missed stitches
- Correct placement of stitching – even spacing between rows
- Fabric not puckered, twisted or pleated in any area.

[8]

(c) Discuss the implications of re-cycling textile products

- Collecting items to re-cycle
- Breaking down products into different components
- Sorting into 'like' fibres
- Removing impurities
- Seperating out other components from fabrics
- Some fibres and fabrics not commercially worth recycling
- Passing on to another company unwanted components
- Re-processing
- Time, water, energy etc. used
- Re-dyeing/finishing
- Making into new product
- Appealing to appropriate market.

Range and relevance of issues relating to the question [3]
Quality of the reasoning and explanation [3]
Suitable use of examples and evidence to support the discussion [2]

[8]

Total: [24]

QUESTION 1,2,3,4,5 1,2,3	GENERIC MARK SCHEME FOR SECTION B UNIT 2524/02 UNIT 2525/02		MARKS AVAILABLE

SPECIFICATION POINTS (SP) A3 Sheet 1 of 4			
SP	**8 Specification Points which are qualified and justified 2 marks each.** **8** clear statements which are specifically related to the focussed topic **8** clear and relevant justification points A clear relevant statement **1 mark** A clear relevant justification **1 mark** Any generic statements that are not explicitly related to the focus = **0 marks** A point repeated or a simple repetition of information already stated in the question is awarded a circled lower case 'r' **A circled lower case 'r' = 0 marks**	**8 x 1** **8 x 1**	**16**

INITIAL IDEAS (ID) A3 Sheet 2 of 4 and A3 Sheet 3 of 4			
R	**Range of ideas.** **0-2** No-weak range of initial ideas (superficial change of shape lacking any depth or detail) **3-4** Limited-some evidence of variation and range of ideas logically laid out **5-6** Good range of different ideas clearly laid out and understood by a third party **7-8** Good range of appropriate innovative significantly different ideas **9-10** A wide range of appropriate innovative significantly different ideas		**10**
S	**Design ideas relating to the <u>functional aspects of the specification</u>.** **0-1** No-little functional aspects of the specification identified or considered **2-3** Limited-some functional aspects of the specification identified or considered **4-5** Clear-detailed evidence of the majority of the functional aspects have been considered in some depth		**5**
V	**Quality of design thinking relating to volume production and wider market issues.** **0-1** No-little consideration given to market issues or volume production in the design thinking **2-3** Limited-some superficial consideration given to market issues or volume production in the design thinking **4-5** Clear-detailed evidence that consideration has been given to market issues or volume production in the design thinking		**5**

C	**Detail Consideration of construction. Methods/construction/component/assembly detail, appropriate to the product and the chosen materials. Knock down fittings and relevant fixings will be given credit.** **0-1** No-little consideration given to suggested appropriate (alternative) methods of construction or assembly **2-3** Limited-some consideration given to suggested appropriate (alternative) methods of construction or assembly **4-5** Clear-detailed evidence has been considered in relation to appropriate (alternative) methods of construction or assembly		**5**
M	**Consideration of specific materials and components (may include calculations or specific values for components).** **Generic terms not acceptable:** • **Plastics-thermoplastics, thermosetting** • **Wood-hardwood, softwood** • **Cloth-natural fibre, synthetic fibre** • **Metal-ferrous, non-ferrous** • **Paper, card and board** **0-1** No-little mention of relevant and appropriate specific materials and components **2-3** Some consideration given to relevant and appropriate specific materials **4-5** Clear evidence of relevant and appropriate specific materials and components		**5**
D	**Consideration of dimensional detail (may include calculations).** **Overall dimensions plus some detailed dimensions required (circuit diagrams/layouts, systems diagrams, flow diagrams).** **0** No indication of scale, dimensions or calculations **1** Limited indication of scale, dimensions or calculations **2** Evidence of general sizes of scale, dimensions and calculations **3** Detailed sizes given in component parts or sub parts of the design		**3**
E	**Evaluation of the suitability of the ideas with reference to the specification.** **0-1** No-little evidence of evaluation commentary **2-3** Limited-some evidence of subjective evaluation commentary **4-5** Clear-detailed evidence of evaluation commentary (may-must include some objective content). Look for intellectual depth of design analysis and formative thinking		**5**

FEATURES SUITABLE FOR DEVELOPMENT (FD) A3 Sheet 4 of 4.			
F	**Appropriate features identified and clearly described. All major aspects of the design should be evident; this may be in the form of annotation of a final drawing or part drawings, or may be in the form of expanded text eg bullet point-listing. Candidates could refer to the design features in terms of strengths and weaknesses. Ideally there should be at least three different features identified.** **0** No-little features identified-concept drawing only, superficial commentary **1-2** Limited-some internal and or external appropriate features identified. Lacks realistic proposals and detail **3-4** Clear-detailed evidence of internal and or external appropriate features identified. Contains constructive and realistic proposals and detail		**4**
J	**Appropriate justification of the choices made with reference to the specification.** **0** No-evidence of justification made, (descriptive, superficial and subjective) **1-2** Limited-some evidence of justification (superficial descriptive statements with elements of objectivity) **3-4** Clear-detailed intellectual constructive justification is evident. Justification is fluent objective and appropriate		**4**

EFFICIENT COMMUNICATION (CS) A3 Sheets 1-4			
CS	**Communication skills and techniques.** **0** No-weak level of graphical skill/annotation evidenced by poor use of communication methods no apparent quality **1-2** Low level of graphical skill/annotation **3-4** Limited-some graphical skill/annotation evidenced by one form of communication method (eg 2D only) lacking appropriate techniques of detail **5-6** Reasonable evidence of variation and range of graphical techniques/annotation appropriately used **7-8** Fluent range of a variety of graphical presentation techniques in evidence with some annotation **9-10** Fluent design thinking that is evident and expressed coherently and cohesively and easily followed and understood by a third party. (Circuit diagrams, systems diagram, exploded views, sectional views 2D and 3D views enlarged detail views and fluent annotation are appropriately used)		**10**

2525/01 Systems and Control Technology 2

1 (a) (i) Much higher density of components, smaller boards.
Fewer holes need to be drilled through abrasive boards.
Simpler automated assembly.
Small errors in component placement are corrected automatically (the surface tension of the molten solder pulls the component into alignment with the solder pads). Any two. One mark each. **[2]**

(ii) Smaller equipment size/more desirable.
Reduces cost to consumer. Any one. **[1]**

(iii) Clean all surfaces first, screen print masking onto boards, apply flux. The pcb first enters a pre-heat zone, where the temperature of the board and all the components is gradually, uniformly raised. (1) The boards then enter a zone where the temperature is high enough to melt the solder particles in the solder paste, bonding the component leads to the pads on the circuit board. (1) After soldering, the boards are washed to remove flux residue and any stray solder balls that could short out closely spaced component leads. (1) **[3]**

(b) (i) Lead is a heavy metal and regarded as a dangerous substance to use in soldering. The removal of solder is a Health and Safety issue to improve the safety of the process. Legal requirement for manufacturers since 2006.(1) **[1]**

(ii) The primary purpose of flux is to prevent oxidation. Active fluxes will clean the joint.(1) **[1]**

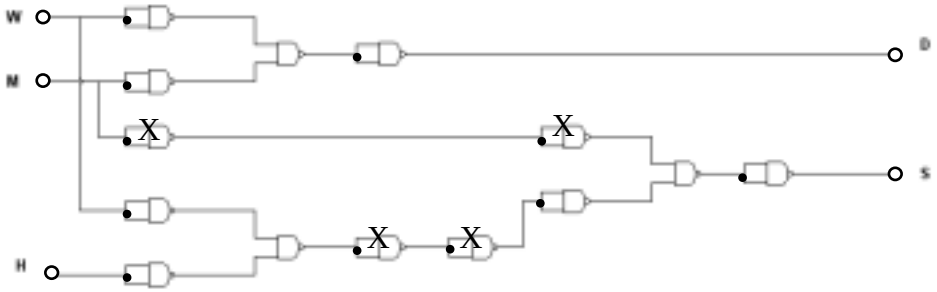
(iii) P = VI so, 20 = 230 x I. (1) Therefore, I = 20/230 = 87mA or 0.087Amps (1) **[2]**

(c) (i)

W	M	H	D	S
0	0	0	1	0
0	0	1	1	0
0	1	0	0	1
0	1	1	0	0
1	0	0	0	0
1	0	1	0	0
1	1	0	0	0
1	1	1	0	0

One mark for columns W,M and H all correct.
One for column D correct and one mark for column S correct. **[3]**

(ii) One mark each for correct removal of extra NAND pairs.



[2]

[2]

(iii) 3 IC's (or 4 IC's if error carried forward) **[1]**

(d) P = Identify a range of relevant issues / points. **[3]**

Q = Quality of explanation as to why these issues are relevant. **[3]**

S = Use of specific examples or supporting evidence. **[2]**

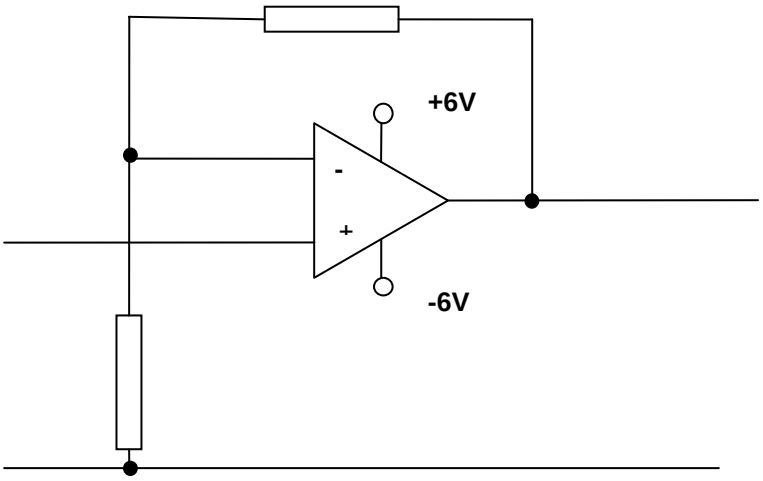
easier communication or similar response.

Possible reasons could be: Save energy, update function, replace modular circuits or similar response

2 **(a)** **(i)** Voltage gain = 1. **[1]**

(ii) Voltage follower used to buffer microphone output (increase current sourcing ability without increase in signal voltage). **[2]**

(b) **(i)** Non-inverting amplifier circuit integrity.
Resistor values for gain of 150 (ie Rf = 149 x Ra). (Allow Rf = 150 x Ra).



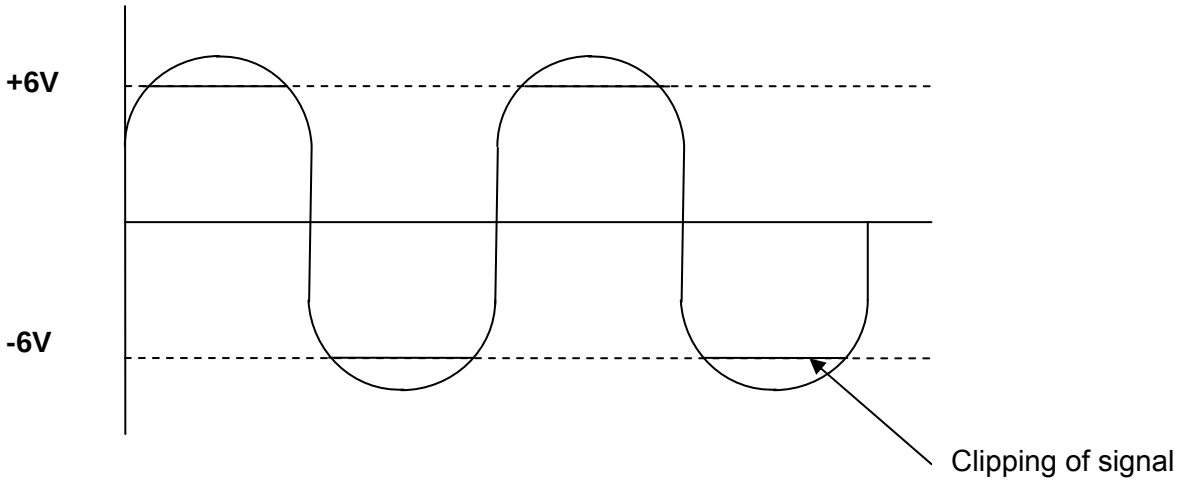
[3]

(ii) Use of coupling capacitors at input and output to stage. **[2]**

(iii) Maximum output limited by 6V power supply.

Max input = 6/150 = 40mV. **[2]**

(iv)



Drawing (1) and clipping (1) **[2]**

(v) Bandwidth is the range of frequencies(1) over which the gain remains constant (1). **[2]**

(vi) Meter is required to at least cover full hearing range frequencies. (1)
Nominal hearing range 20Hz – 20kHz (1) **[2]**

(c) P = Identify a range of relevant issues / points. **[3]**

Q = Quality of explanation as to why these issues are relevant. **[3]**

S = Use of specific examples or supporting evidence. **[2]**

Issues might include:

Danger of injury, loss of privacy, annoyance to others, security if using internet.

3 (a) (i) Belt drive, (1) chain drive, (1) toothed belt drive. (1) **[3]**

(b) (i) The input of the clutch is connected to the drive shaft while the output may drive a shaft, chain, or belt. As drive speed increases, weighted arms in the clutch swing outward, (1) against spring tension, (1) and force the clutch to engage the friction pads or shoes radially mounted that engage the inside of the rim of a housing. (1) When the drive speed drops the springs reassert themselves and disengage the clutch. (1) **[4]**

(ii) mopeds, go-karts, chainsaw. Any one. (1) **[1]**

(iii) Friction, single-plate, diaphragm spring, dog clutch. Any one. (1) **[1]**

(c) (1/2) for quality of sketch, (2/1) for quality of detailed notes explaining sketch. Example answer might involve: grub screw and collar or keyway or spline or taper shafts. **[3]**

(d) Speed of roller =600 x 9/24 x 9/33 = 61.36rpm (1)
Circumference of roller = πd = π x 0.3m = 0.9425m (1)
Speed of mower = 61.36 x 0.9425 = 57.83 metres per minute (1)
57.83 metres per minute = 0.964m/s (1) or similar method to final answer. **[4]**

(e) P = Identify a range of relevant issues/points. **[3]**

Q = Quality of explanation as to why these issues are relevant. **[3]**

S = Use of specific examples or supporting evidence. **[2]**

Issues might include: Potential fines, compost, not burning waste, helping the planet, less landfill required or similar issues.

4 **(a)** Very high gear ratio, will not reverse, changes motion through 90º.
Any two. **[2]**

(b) **(i)** 40 : 1 **[1]**

(ii) $\frac{40}{20} \times \frac{40}{1}$ [1] = 80 : 1 [1] **[2]**

(c) **(i)** ball, radial, roller bearing, or similar. **[1]**

(ii) Ball/roller bearing suitable radial load, ease of rotation, no rubbing, lubricated. Any two. **[2]**

(d) **(i)** A factor of safety is a factor by which the greatest expected load is multiplied [1] to give a safety margin for the specific design. [1] Generally it is stated in the relevant code of practice. **[2]**

(ii) f = 1850 x 10 = 18500N [1]
Stress = F /A = $\frac{18500}{\pi \times 0.0175^2}$ [1] = 19.22 MN/m² [2] **[4]**

(e) The counterbalance is used to conserve energy. [1] The weight of the counterbalance is chosen to equal approx. 40% of capacity of lift or similar. [1] **[2]**

(f) P = Identify a range of relevant issues/points. **[3]**

Q = Quality of explanation as to why these issues are relevant. **[3]**

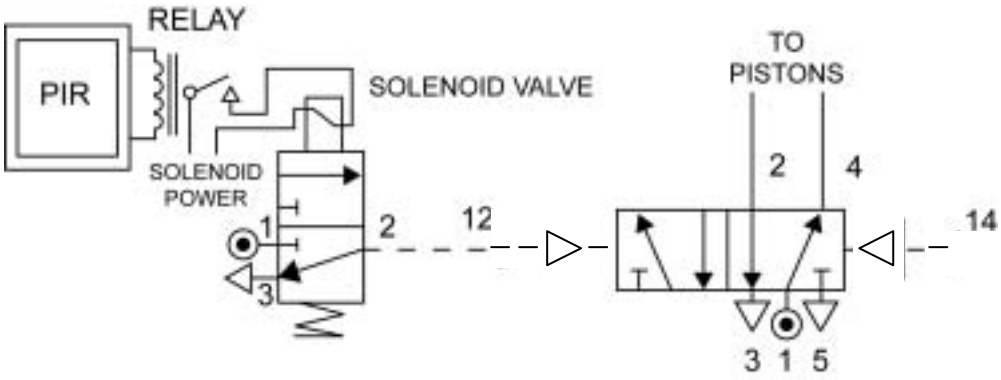
S = Use of specific examples or supporting evidence. **[2]**

Points might include:

Fire, vandalism, backup safety systems, maintenance, number of passengers, height of lift, speed of lift, access to lift or similar suitable issues.

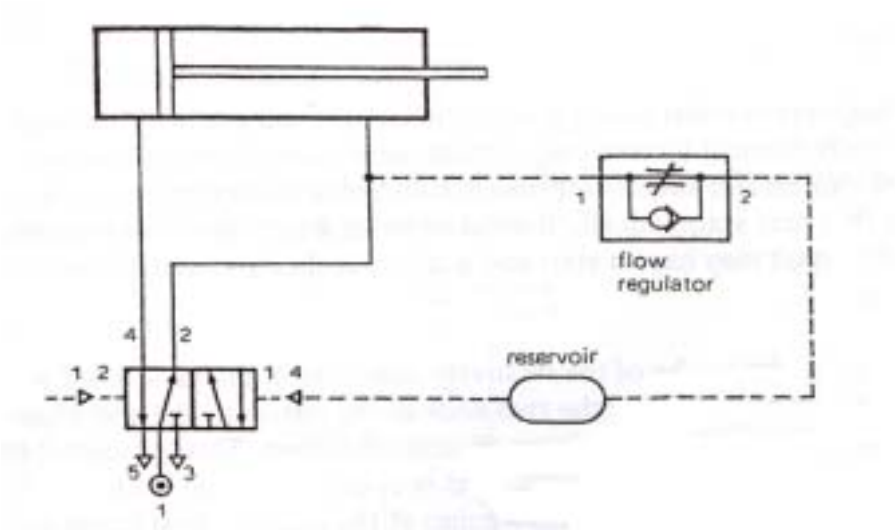
5 **(a)** Give clear access, keep the weather out, operate smoothly, hardwearing materials, non-toxic materials, smooth edges, safety aspects, manual opening system, etc. Any three, one mark each. **[3]**

(b) **(i)** Requires the use of a solenoid operated valve in place of the 'open' pushbutton valve.
Relay energised as person approaches PIR, from either side. Power applied to solenoid so signal to 5 – port valve 1 2 causing doors to open, or similar. Up to [2] for good explanation. [1] Correct solenoid operation [1] Correct pneumatic circuit. **[4]**



(ii) [1] Shuttle Valve [1] Correct symbol **[2]**

(iii) Flow regulator and reservoir to give adjustable delay on close. [1] for flow regulator, [1] for reservoir, [1] for correct piping, [1] notes/explanation.



As above or similar **[4]**

(c) F = p x A. 960N = 0.75 x A. 1280 = A. [1]
So, $\frac{1280 \times 4}{\pi}$ = d². [1] d = 40mm [1] **[3]**

(d) P = Identify a range of relevant issues/points. **[3]**

Q = Quality of explanation as to why these issues are relevant. **[3]**

S = Use of specific examples or supporting evidence. **[2]**

Issues could include:
Regular maintenance, public liability insurance, quality/hardwearing materials, non-toxic materials, smooth edges, safety notices, etc plus similar suitable responses.

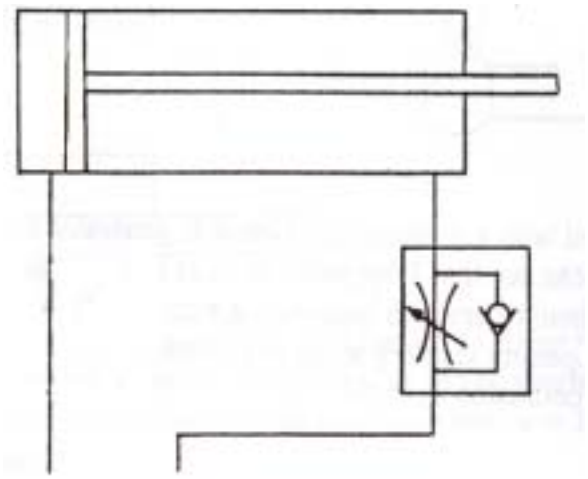
6 (a) (i) Plunger **[1]**

(ii) Unidirectional flow control valve or flow regulator. **[1]**

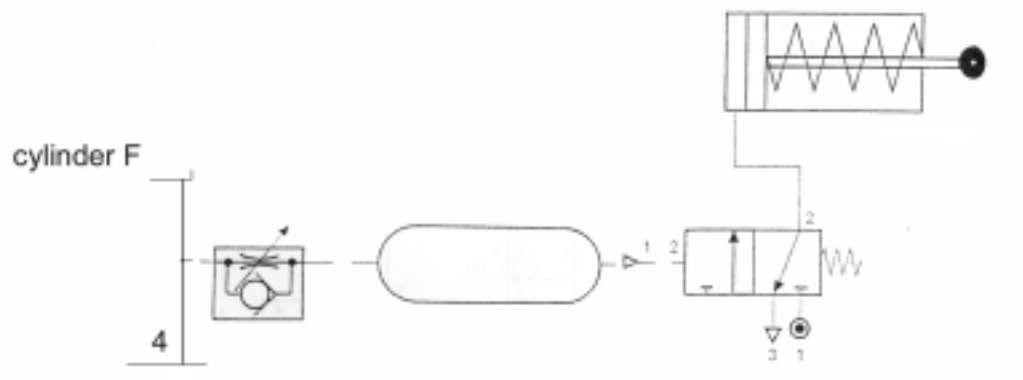
(iii) When stamp pushes box it depresses plunger on valve E [1] which causes signal air to valve D 14 and so mains air is supplied to cylinder F [1] causing it to in-stroke. **[2]**

(b) Flow regulator placed in exhaust of cylinder F out-stroke. [1] Flow regulator will control exhaust while allowing free flow for in-stroke air. [1]

Sketch: correct symbol for flow regulator [1], correctly positioned [1] **[4]**



(c) System used must ensure cylinder F is in-stroked or instroking. Shown is time delayed outstroke of an SAC. Air for new part of circuit derived from mains air to instroke cylinder F. As below or similar. Up to [2] for good explanation. Up to [2] for working circuit. **[4]**



(d) V = L x A x c.r. (for one stroke) c.r. = P + 1 bar = 7 bar. [1]
V = L x A x 7. V = 5 x 3.14 x 7 cm^3 = 109.9cm^3 (for one stroke)[1]
For 40 strokes/min V = 109.9 x 40 cm^3/min = 4396cm^3/min[1] = 4.396 litres/min [1] **[4]**

(e) P = Identify a range of relevant issues / points. **[3]**

Q = Quality of explanation as to why these issues are relevant. **[3]**

S = Use of specific examples or supporting evidence. **[2]**

Issues could include:
Regular/ease of maintenance, food handling, non-toxic materials/ hygiene, etc. plus similar suitable responses.

Grade Thresholds

Advanced GCE Design and Technology (7822, 7823)

January 2010 Assessment Series

Unit Threshold Marks

Unit		Maximum Mark	A	B	C	D	E	U
2522	Raw	90	72	63	54	45	36	0
	UMS	90	72	63	54	45	36	0
2523	Raw	90	72	63	54	45	36	0
	UMS	90	72	63	54	45	36	0
2524	Raw	120	73	65	58	51	44	0
	UMS	120	96	84	72	60	48	0
2525	Raw	120	77	70	63	56	50	0
	UMS	120	96	84	72	60	48	0

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
7822, 7823	600	480	420	360	300	240	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
7822	14.89	42.55	68.09	91.49	100	100	47
7823	0.00	0.00	0.00	0.00	0.00	0.00	0

47 candidates aggregated this series

0 candidates aggregated this series

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/learners/ums/index.html

Statistics are correct at the time of publication

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