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Unit 1: Written Paper

Final

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SECTION A

1. An electric guitar requires a sound system to function correctly.
Figure 1 shows the circuit diagram of an amplifier.

(a) In the spaces below correctly identify each labelled component.

A Transistor (1)
B Resistor (1)
C Speaker (1)
D Capacitor (1)

4 marks

1(b) (i) Explain why the neck of a guitar has to withstand compression,

Answers such as:

- A compressive force tries to crush an object.
- Forces act from the outside pushing inwards
- The tension in the strings

1 mark for a simple or partly correct answer. 2 marks for a full answer, or 2 good points.

2 marks

1(b) (ii) Strings have to withstand tension, explain what is meant by tension.

- A tensile force attempts to **pull** an object apart.
- The strings must tighten without stretching or snapping
- How **tight** the strings are.

1 mark for a simple or partly correct answer. 2 marks for a full answer, or 2 good points.

2 marks

1(c) Explain how a machine head on a guitar works.

- A system of gears which turn motion through 90 degrees.
- A worm and wheel system which only allows input rotation.
- A correct description of the operation of a machine head.

1 mark for a simple or partly correct answer. 2 marks for a full answer, or 2 good points.

2 marks

1 (d) In the spaces below identify three pieces of information a designer would need from a client to be able to produce a design for a guitar stand.

One mark per information point such as:

Preferred :-

- Construction material
- Finish
- Colour
- Non scratch covering material
- Price range
- Size – allow wide
- Storage capacity
- Situation of proposed stand

3 marks

1(e) Using the three points identified in part 1(d), add relevant details to produce an initial specification statement for a guitar stand.

Full marks for answers comprising information such as:

- development of client information.
- clear intentions stated.
- inclusion of further relevant detail

[for each numbered specification point 2 marks up to max]

6 marks

1(f) Describe **and** explain the role that modern technology has played in the development of electronic equipment such as amplifiers and sound systems

Up to 3 marks available for technical content from points such as:

- reliability or quality improved
- size of electronic equipment reduced.
- mobility of equipment greatly improved.
- advances in technology have created much more robust equipment.
- valves replaced by transistors
- wireless connection / transmission e.g. Bluetooth Technology etc.
- cost reduction
- use of CAD to design circuits
- use of ICT to test electronic circuits.

[1 mark per point max 3]

Plus

Up to 3 marks available for command of English.

- Some attempt made (1)
- Logical structured answer, possibly some punctuation and grammar inaccuracies. (2)
- Technically correct and well punctuated in good flowing English. (3)

6 marks

[Total 25 marks]

2. Using the notes and sketches describe how a guitar string is attached to the body of the guitar **and** how the string's vibrations are transmitted.

Attachment sketches and notes indicating features such as:

- knots used on Spanish guitars
- bridge pins and grommets
- end plugs that wedge into place through holes in the body of an electric guitar.

(5)

transmission sketches and notes indicating features such as:

- electronic pick-ups under the strings
- vibration sensors
- vibrations boosted by amplifier
- use of resonance in classic guitar body.

(5)

Marks for information in notes 5
Marks for information in sketches 5 **10 marks**

3. Shown below are a two electric guitars. Study **Figure 2** then answer the questions which follow.

3 (a) (i) Explain why the body shape of electric guitars can differ so much.

Answers such as:

- Electronic guitar body does not need to be hollow so can be much thinner and can be of almost any shape.
- Sound is produced electronically so the body shape and structure is technically immaterial.
- looks aesthetics (1)
- fitting of components.

2 marks

3 (a) (ii) Identify a material suitable for making the body of an electric guitar.

Answers such as:

- MDF / Plywood
- Solid natural timbers (include wood)
- Plastics [specific type required e. g. Acrylic]
- Metals [specific type required e. g. Stainless Steel].

1 mark

3 a) (iii) Identify **and** describe a suitable industrial method of producing the body shape for a mass produced electric guitar.

Method . Any suitable CNC, automated or semi-automated cutting process or machine.

such as:

- Allow CNC/CAM
- Router
- Profiler
- Miller
- Laser
- Band Saw
- Injection mould (1)

Description of process covering points such as:

- communication of design to machine
- how material is held in place while being cut
- use of x and y axes on cutting machine
- use of patterns or jigs (4)

5 marks

3(b) Identify a decorative surface finish **other than polishing**, which can be applied to metal surfaces **and** describe in detail how such a finish could be achieved.

I mark for a surface finish such as:

- engine or mill turned.
- wire brushing or satin finish
- plating
- painting
- lacquering
- powder and dip coating

(1)

Description of stages such as:

- Identify equipment required for chosen process
- Application of chosen finish

[1 mark per relevant point up to max 3]

(3)

4 marks

4. **Figure 3** below shows the parts of a stainless steel tremolo lever for an electric guitar.

4 (a) Use the information supplied in figures 3 and 4 to complete the Front elevation in figure 4 to an appropriate standard.

4 (a) (i) Complete the front elevation as a sectioned view of the brass knob shown on AA.

- Show cross hatching (1)
- Leave hole area un-hatched (1)
- Screw thread convention (1)
- Show centre-line (1)

4 marks

4 (a) (ii) add one accurate linear dimension;

- Dimension correct [can only be 15 mm or 4 mm] (1)
- Correct use of dimension standards (1)

2 marks

4(b) In the table below, create a Production Plan listing five major operations needed to complete the tremolo lever to the required specification. Some parts have been done for you; select the others from the list given beneath the table by inserting the identification letter (A to J) in the appropriate box.

- Accept words and/or letters as correct.

Order	Operation	Tools and Equipment	Description of task carried out.
1	Material Preparation	**F**	**B**
2	Turning	**D**	**J**
3	Threading	**I**	**G**
4	Bending	**A**	**C**
5	Polishing	**H**	**E**

Accept words and/or letters as correct.

Use the information below to complete the production plan.

Bending jig: **A**

Hack saw: **F**

Buffing wheel and abrasives: **H**

Position and form 25 degree angle in tremolo lever: **C**

Cut 6mm stainless steel bar to length: **B**

Produce a high quality shining surface on the lever: **E**

Cut an M4 thread on one end of the machined stainless steel bar to fit the knob supplied: **G**

Reduce stainless steel bar to 4 mm diameter for a distance of 15 mm at each end: **J**

Die and Die Stock: **I**

Lathe: **D**

1 mark for each correct answer **10 marks**

5. Identify two potential health and safety hazards linked to using a centre lathe **and** explain how they can be avoided.

Select two from **hazards** such as:

- nips / traps and crushes
- sharp objects
- rotation
- irritants
- flying debris
- leaving the chuck key in

(2)

Two **explanations** such as:

- problems can occur, where good working practice is not observed and inattention or carelessness takes place.
- machines have moving parts, wearing the correct PPE can help minimise the risks involved in using them.
- materials can have dermatological effects use of barrier creams and basic hygiene e.g. hand washing.
- eye damage is always a possibility use of appropriate eyewear and guards where fitted, should be mandatory.

(4)

6 marks

6. A standard mains electrical plug is shown below.

The inner wires have become twisted.

6(a) Identify the danger **and** explain in detail how the hazard should have been avoided.

Danger .. Select from answers such as:

- Short circuit inside the plug
- Earth connection may not be in place
- Fire hazard
- Poor storage

(1)

Explanation Select from answers such as:

- the outer casing of the cable should have been securely anchored inside the plug using the built in clamp.
- regular maintenance checks should identify such problems and take the unit out of use until rectified.
- operative should check equipment personally before use
- PAT

(2)

6(b) The outer casing of the cable has been damaged and wrapped with tape.

Identify **two** possible dangers this repair could cause.

Possible dangers Select from answers such as:

- weakened cable may overheat causing insulation to melt and produce a short circuit.
- tape may not be up to the task causing a direct hazard to the user. [Electric shock]
- using / providing equipment thus repaired contravenes HASAW act.

(2)

How could this cable be safely re-used ..

Give an answer such as:

- cut away damaged area of cable and correctly fit a new plug. (1)

6 Marks

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