



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate 2018

Marking Scheme

Technology Tasks

Higher and Ordinary Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.

Instructions to candidates:

1. Design and make any **one** of the design tasks listed opposite.
2. The design task submitted for assessment must consist of two components: a design folder **and** an artefact.
3. If **either** assessment component (written examination or coursework) is submitted at Ordinary Level, the subject is graded at Ordinary Level.
4. All work submitted for assessment must be clearly identified with your examination number.
5. Tasks submitted for assessment must be the candidates **own individual work**.
6. The design task must be completed **in school** under the supervision of the class teacher.
7. When using research sources, including the Internet, the sources must be acknowledged. Research material copied directly from the Internet or from other sources and presented as your own work will not receive any marks.
8. Shading and colour should be used where appropriate in your design folder.
9. Coursework which does not demonstrate a range of manual processing skills and appropriate assembly techniques as outlined in the syllabus will lose marks.
10. Coursework where specialist processes (e.g. CAD CAM) are used, but are not supported in the design folder by the inclusion of drawings and/or descriptions as appropriate will lose marks.
11. If micro-processors are used in the electronic sub-system a diagram showing the relevant Inputs and Outputs as well as the flowsheet/program should be included in your design folder.
12. All important operating features must be easily accessible.
13. Presentation and finished appearance of both folder and artefact are important.

The Design Task must be available for assessment by Friday 27 April 2018.

Storage of design tasks:

On completion of the design task, school authorities should ensure that the finished artefact and design folder are kept in a safe place under lock and key until the examining process (including appeals) has concluded.

Allocation of marks:

Design Tasks

240 marks are allocated for design tasks at Ordinary Level.

200 marks are allocated for design tasks at Higher Level.

The Design Folder

Forty percent (40%) of the marks are allocated for the design folder.

The Artefact

Sixty percent (60%) of the marks are allocated for the artefact.

Marking Scheme

The table below gives an outline of the marking headings used to assess your task. While the same headings apply at both levels, the marking criteria at Higher Level demand greater detail and precision in both the design folder and the artefact. While the general headings and marks will largely remain the same, assumptions about future marking schemes on the basis of past schemes should be avoided.

Ordinary and Higher Level marking schemes are available on www.examinations.ie

It is recommended that evidence of each stage is reflected in your design folder.

Folder		
Analysis of brief	Analysis should incorporate the following features: Breakdown of the brief and design specification/list of objectives specific to the task.	5
Investigation of possible solutions	Evidence of investigation: (sketches, photos, descriptions, etc.) Relevant research on the task itself and its mechanical/electronic systems.	5
Design Ideas	One Design Idea presented in 3D format (Ordinary level). Two Design Ideas presented in 3D format ((Higher level).	6
Criteria for selection of solution	Valid justification of your selected idea and the sub-system/s.	4
Sketches /drawings for manufacture	Working drawings of the chosen solution and circuit drawing/s (flow-sheet where applicable).	6
Manufacturing sequence/processes	Sequence of events for the manufacture of the chosen solution. Materials List with sizes and costs.	5
Testing and Evaluation	Evidence of testing/modification during manufacture and evaluation against the brief/design specification and/or third party evaluation.	5
Presentation of folder	Layout: use of diagrams, sketches, photographs, neat and orderly.	4
Artefact		
Artefact satisfies brief	Does the artefact produced by the candidate satisfy the brief?	5
Suitability, Functionality	Do all the necessary elements of the artefact function?	5
Design/Inventiveness	Inventive design of the artefact and sub-system?	5
Originality, commercial comp.	Creative use of materials/recycled parts/electro-mechanical components/mechanisms/colour/shape. Acceptable use of commercial components?	5
Appropriateness of materials	Materials selected suited to their respective functions?	5
Appropriate sub-system(s)	Appropriate electro-mechanical/electronic sub-system?	5
App. manufacturing processes	Complete artefact and sub-system manufactured using appropriate processes?	5
Quality of processes	Quality of the artefact after manufacture?	5
Assembly	Appropriate methods of assembly used? Quality of assembly.	5
Detailed finish/Safety Considerations	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	5
Tech. competencies/ Application of skills	Appropriate level and range of skills/technological competencies?	5
Overall presentation	Attractive, well presented artefact?	5

A**LED Study Lamp**Design and make an **electro-mechanically adjustable LED study lamp**.**Ordinary Level Folder**

<i>Analysis of brief</i>	Design should incorporate the following features: LED study lamp. Should be electro-mechanically adjustable.	5
<i>Investigation of possible solutions</i>	Evidence of investigation: (sketches, photos, etc.) Examples of LED study lamps and relevant mechanical/electronic systems.	5
<i>Design Ideas</i>	LED study lamp to satisfy the brief: Sketch of one design shown.	6
<i>Criteria for selection of solution</i>	Valid justification of this idea (at least two reasons).	4
<i>Sketches /drawings for manufacture</i>	Manufacture drawing of the chosen solution and sub-system.	6
<i>Manufacturing sequence/processes</i>	Sequence of events for manufacture of the chosen solution (where a materials list is presented to the exclusion of the manufacturing sequence: 2 marks)	5
<i>Testing and Evaluation</i>	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	5
<i>Presentation of folder</i>	Layout: use of diagrams, sketches, photographs, neat and orderly.	4

Ordinary Level Product

<i>Product satisfies brief</i>	Is the product an electro-mechanically adjustable LED study lamp?	5
<i>Suitability, Functional</i>	Do all the necessary elements of the LED study lamp function?	5
<i>Design/Inventiveness</i>	Inventive design of the LED study lamp and sub-system?	5
<i>Originality, commercial comp.</i>	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	5
<i>Appropriateness of materials</i>	Materials selected suited to their respective functions?	5
<i>Appropriate sub-system(s)</i>	Appropriate lighting and electro-mechanical sub-system?	5
<i>App. manufacturing processes</i>	Complete LED study lamp and sub-system manufactured using an appropriate range of processes?	5
<i>Quality of processes</i>	Quality of the product after manufacture?	5
<i>Assembly</i>	Appropriate methods of assembly used? Quality of assembly.	5
<i>Detailed finish/Safety Considerations</i>	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	5
<i>Tech. competencies/ Application of skills</i>	Appropriate level and range of skills/technological competencies?	5
<i>Overall presentation</i>	Attractive, well presented product?	5

LED Study Lamp

A

Design and make an **electro-mechanically adjustable LED study lamp**.

Higher Level Folder

<i>Analysis of brief</i>	Problem posed by brief broken down into identifiable units?	5
	A. Design should incorporate the following features: LED study lamp, Electro-mechanically controlled (0-2) B. Design specification generated/list of objectives..... (0-3) (Restate brief: Total mark = 1)	
<i>Investigation of possible solutions</i>	Evidence of investigation/identification/research: (sketches, photos, etc.)	5
	A. Various types of LED study lamp (0-3) B. electro-mechanical sub-system/electronic system..... (0-2)	
<i>Design Ideas</i>	A. LED study lamp Design 1 - well sketched & annotated (0-3) B. LED study lamp Design 2 - well sketched & annotated (0-3)	6
	A. Selected design identified. (0-1) B. Valid justification of selected design idea and sub-system (0-3)	4
<i>Sketches /drawings for manufacture</i>	Dimensioned/scaled drawings-sketches associated with manufacture.	6
	A. Detailed drawings of the chosen solution (0-3) B. Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . (0-3)	
<i>Manufacturing sequence/processes</i>	A. Sequence of events for manufacture of the chosen solution (0-2) B. Materials list with sizes and costing (0-3)	5
	A. Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation (0-3) B. Possible improvements identified..... (0-2)	5
<i>Presentation of folder</i>	A. Layout: use of diagrams, sketches, photographs, neat and orderly (0-3) B. Correct sequence of presentation as outlined in form S.67 (Design Tasks)... (0-1)	4

Higher Level Product

<i>Product satisfies brief</i>	A. Is the product an LED study lamp and is it complete? (0-3) B. Does it incorporate an electro-mechanical sub-system? (0-2)	5
	A. Does the LED study lamp function? (0-3) B. Does the electro-mechanical system work? (0-2)	5
<i>Suitability, Functional</i>	A. Inventive design of the LED study lamp and subsystem and/or mock-up of all or part of the solution? (model = 2) (0-5)	5
<i>Design/Inventiveness</i>	A. Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components? (0-5)	5
<i>Originality, commercial comp.</i>	A. Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... (0-5)	5
<i>Appropriateness of materials</i>	A. Appropriate lighting and electro-mechanical sub-system, reliable? (0-5) (Not working max. mark 4)	5
<i>Appropriate sub-system(s)</i>	A. LED study lamp manufactured using an appropriate range of processes? (0-3) B. sub-system manufactured using an appropriate range of processes? (0-2)	5
	A. Quality of LED study lamp after manufacture using stated processes? (0-3) B. Quality of the sub-system after manufacture? (0-2)	5
<i>Quality of processes</i>	A. Appropriate methods of assembly used? (0-3) B. Quality of assembly (0-2)	5
<i>Assembly</i>	A. No sharp edges or other safety hazards? (0-3) B. All parts well finished? (0-2)	5
<i>Detailed finish/Safety Considerations</i>	Does the product demonstrate that the candidate has an: A. Appropriate range & level of technological competencies? (lamp)..... (0-3) B. Appropriate range & level of technological competencies? (sub-system) (0-2)	5
<i>Tech. competencies/ Application of skills</i>	A. Attractive well presented product?..... (0-4) B. Instructions for use (if needed), controls labelled?..... (0-1)	5
<i>Overall presentation</i>		5

Remotely Controlled Vehicle

B

Design and make a working model of a **remotely controlled vehicle** capable of traversing soft ground and small obstacles. **Note:** *Wireless* remote control is not required.

Ordinary Level Folder

<i>Analysis of brief</i>	Design should incorporate the following features: Remotely controlled vehicle. Capable of travelling over soft ground & small obstacles.	5
<i>Investigation of possible solutions</i>	Evidence of investigation: (sketches, photos, etc.) Various types of soft ground traversing vehicles, obstacle traversing vehicles, possible electro-mechanical sub-systems and remote controls.	5
<i>Design Ideas</i>	Remotely controlled vehicle to satisfy the brief: Sketch of one design shown.	6
<i>Criteria for selection of solution</i>	Valid justification of this idea (at least two reasons).	4
<i>Sketches /drawings for manufacture</i>	Manufacture drawing of the chosen solution and sub-system.	6
<i>Manufacturing sequence/processes</i>	Sequence of events for manufacture of the chosen solution (where a materials list is presented to the exclusion of the manufacturing sequence: 2 marks)	5
<i>Testing and Evaluation</i>	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	5
<i>Presentation of folder</i>	Layout: use of diagrams, sketches, photographs, neat and orderly.	4

Ordinary Level Product

<i>Product satisfies brief</i>	Is the product a remotely controlled vehicle capable of traversing soft ground and small obstacles?	5
<i>Suitability, Functional</i>	Do all the necessary elements of the remotely controlled vehicle function?	5
<i>Design/Inventiveness</i>	Inventive design of the remotely controlled vehicle and sub-system?	5
<i>Originality, commercial comp.</i>	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	5
<i>Appropriateness of materials</i>	Materials selected suited to their respective functions?	5
<i>Appropriate sub-system(s)</i>	Appropriate electro-mechanical control system?	5
<i>App. manufacturing processes</i>	Complete remotely controlled vehicle manufactured using an appropriate range of processes?	5
<i>Quality of processes</i>	Quality of the product after manufacture?	5
<i>Assembly</i>	Appropriate methods of assembly used? Quality of assembly.	5
<i>Detailed finish/Safety Considerations</i>	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	5
<i>Tech. competencies/ Application of skills</i>	Appropriate level and range of skills/technological competencies?	5
<i>Overall presentation</i>	Attractive, well presented product?	5

Remotely Controlled Vehicle

B

Design and make a working model of a **remotely controlled vehicle** capable of traversing soft ground and small obstacles. **Note:** *Wireless* remote control is not required.

Higher Level Folder

<i>Analysis of brief</i>	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) A. Remotely controlled vehicle, travel over soft ground/small obstacles..... (0-2) B. Design specification generated/list of objectives..... (0-3)	5
<i>Investigation of possible solutions</i>	Evidence of investigation/identification/research: (sketches, photos, etc.) A. Various types of vehicles that fit the brief, (0-3) B. Electro-mechanical sub-systems, remote control handsets (0-2)	5
<i>Design Ideas</i>	A. Remotely controlled vehicle design 1 - well sketched & annotated (0-3) B. Remotely controlled vehicle design 2 - well sketched & annotated (0-3)	6
<i>Criteria for selection of solution</i>	A. Selected design identified. (0-1) B. Valid justification of selected design idea and sub-system (0-3)	4
<i>Sketches /drawings for manufacture</i>	Dimensioned/scaled drawings-sketches associated with manufacture. A. Detailed drawings of the chosen solution (0-3) B. Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . (0-3)	6
<i>Manufacturing sequence/processes</i>	A. Sequence of events for manufacture of the chosen solution. (0-2) B. Materials list with sizes and costing..... (0-3)	5
<i>Testing and Evaluation</i>	A. Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation (0-3) B. Possible improvements identified..... (0-2)	5
<i>Presentation of folder</i>	A. Layout: use of diagrams, sketches, photographs, neat and orderly (0-3) B. Correct sequence of presentation as outlined in form S.67 (Design Tasks)... (0-1)	4

Higher Level Product

<i>Product satisfies brief</i>	A. Is the product a remotely controlled vehicle and is it complete? (0-3) B. Is the vehicle designed to traverse soft ground and small obstacles? (0-2)	5
<i>Suitability, Functional</i>	A. Does the remotely controlled vehicle function? (0-3) B. Is it capable of traversing soft ground and small obstacles?..... (0-2)	5
<i>Design/Inventiveness</i>	A. Inventive design of the remotely controlled vehicle and sub-system and/or mock-up of all or part of the solution? (model = 2) (0-5)	5
<i>Originality, commercial comp.</i>	A. Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components? (0-5)	5
<i>Appropriateness of materials</i>	A. Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... (0-5)	5
<i>Appropriate sub-system(s)</i>	A. Appropriate electro-mechanical sub-system? (0-3) B. Appropriate soft ground/small obstacle traversing system? (0-2) (Not working max. mark 4)	5
<i>App. manufacturing processes</i>	A. Remote control & vehicle manufactured using an appropriate range of processes? (0-3) B. Sub-system manufactured using an appropriate range of processes? (0-2)	5
<i>Quality of processes</i>	A. Quality of remotely controlled vehicle after manufacture (0-3) B. Quality of the control system after manufacture?..... (0-2)	5
<i>Assembly</i>	A. Appropriate methods of assembly used? (0-3) B. Quality of assembly (0-2)	5
<i>Detailed finish/Safety Considerations</i>	A. No sharp edges or other safety hazards?..... (0-3) B. All parts well finished? (0-2)	5
<i>Tech. competencies/ Application of skills</i>	Does the product demonstrate that the candidate has an: A. Appropriate range & level of technological competencies? (vehicle) (0-3) B. Appropriate range & level of technological competencies? (sub-system) (0-2)	5
<i>Overall presentation</i>	A. Attractive well presented product?..... (0-4) B. Instructions for use (if needed), controls labelled?..... (0-1)	5

Mouse Trap

C

Mice can be seen as unwanted visitors to homes and businesses. Design and make a **mouse trap** to capture a mouse without injury. The trap should **signal electronically** when a mouse has been trapped.

Ordinary Level Folder

<i>Analysis of brief</i>	Design should incorporate the following features: Mouse trap to capture a mouse without injury, including electronic signalling to indicate a mouse is caught.	5
<i>Investigation of possible solutions</i>	Evidence of investigation: (sketches, photos, etc.) Various types of mouse traps, sensing and signalling systems.	5
<i>Design Ideas</i>	Humane mouse trap to satisfy the brief: Sketch of one design shown.	6
<i>Criteria for selection of solution</i>	Valid justification of this idea (at least two reasons).	4
<i>Sketches /drawings for manufacture</i>	Manufacture drawing of the chosen solution and sub-system.	6
<i>Manufacturing sequence/processes</i>	Sequence of events for manufacture of the chosen solution (where a materials list is presented to the exclusion of the manufacturing sequence: 2 marks)	5
<i>Testing and Evaluation</i>	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	5
<i>Presentation of folder</i>	Layout: use of diagrams, sketches, photographs, neat and orderly.	4

Ordinary Level Product

<i>Product satisfies brief</i>	Is the product a humane mouse trap with an electronic output signalling the mouse has been caught?	5
<i>Suitability, Functional</i>	Do all the necessary elements of the mouse trap function?	5
<i>Design/Inventiveness</i>	Inventive design of the mouse trap and sub-system?	5
<i>Originality, commercial comp.</i>	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	5
<i>Appropriateness of materials</i>	Materials selected suited to their respective functions?	5
<i>Appropriate sub-system(s)</i>	Appropriate electronic signalling sub-system?	5
<i>App. manufacturing processes</i>	Complete mouse trap and sub-system manufactured using an appropriate range of processes?	5
<i>Quality of processes</i>	Quality of the product after manufacture?	5
<i>Assembly</i>	Appropriate methods of assembly used? Quality of assembly.	5
<i>Detailed finish/Safety Considerations</i>	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	5
<i>Tech. competencies/ Application of skills</i>	Appropriate level and range of skills/technological competencies?	5
<i>Overall presentation</i>	Attractive, well presented product?	5

Mouse Trap

C

Mice can be seen as unwanted visitors to homes and businesses. Design and make a **mouse trap** to capture a mouse without injury. The trap should **signal electronically** when a mouse has been trapped.

Higher Level Folder

<i>Analysis of brief</i>	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) A. Humane mouse trap, with electronic signalling..... (0-2) B. Design specification generated/list of objectives..... (0-3)	5
<i>Investigation of possible solutions</i>	Evidence of investigation/identification/research: (sketches, photos, etc.) A. Various types of humane mouse trap, (0-3) B. Existing mechanical/electronic solutions.. (0-2)	5
<i>Design Ideas</i>	A. Mouse trap design 1 - well sketched & annotated (0-3) B. Mouse trap design 2 - well sketched & annotated (0-3)	6
<i>Criteria for selection of solution</i>	A. Selected design identified. (0-1) B. Valid justification of selected design idea and sub-system (0-3)	4
<i>Sketches /drawings for manufacture</i>	Dimensioned/scaled drawings-sketches associated with manufacture. A. Detailed drawings of the chosen solution (0-3) B. Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . (0-3)	6
<i>Manufacturing sequence/processes</i>	A. Sequence of events for manufacture of the chosen solution. (0-2) B. Materials list with sizes and costing..... (0-3)	5
<i>Testing and Evaluation</i>	A. Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation (0-3) B. Possible improvements identified..... (0-2)	5
<i>Presentation of folder</i>	A. Layout: use of diagrams, sketches, photographs, neat and orderly (0-3) B. Correct sequence of presentation as outlined in form S.67 (Design Tasks)... (0-1)	4

Higher Level Product

<i>Product satisfies brief</i>	A. Is the product a humane mouse trap and is it complete? (0-3) B. Does it have an electronic signalling system indicating a mouse is caught?.. (0-2)	5
<i>Suitability, Functional</i>	A. Is the Mouse trap suitable for use?..... (0-3) B. Does it have a functional electronic signalling system? (0-2)	5
<i>Design/Inventiveness</i>	A. Inventive design of the Mouse trap and sub-system and/or mock-up of all or part of the solution? (model = 2) (0-5)	5
<i>Originality, commercial comp.</i>	A. Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components? (0-5)	5
<i>Appropriateness of materials</i>	A. Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... (0-5)	5
<i>Appropriate sub-system(s)</i>	A. Appropriate trapping sub-system?..... (0-3) B. Appropriate electronic sub-system? (0-2) (Not working max. mark 4)	5
<i>App. manufacturing processes</i>	A. Mouse trap manufactured using an appropriate range of processes? (0-3) B. sub-system manufactured using an appropriate range of processes? (0-2)	5
<i>Quality of processes</i>	A. Quality of mouse trap after manufacture (0-3) B. Quality of the signalling system after manufacture? (0-2)	5
<i>Assembly</i>	A. Appropriate methods of assembly used? (0-3) B. Quality of assembly (0-2)	5
<i>Detailed finish/Safety Considerations</i>	A. No sharp edges or other safety hazards? (0-3) B. All parts well finished? (0-2)	5
<i>Tech. competencies/ Application of skillss</i>	Does the product demonstrate that the candidate has an: A. Appropriate range & level of technological competencies? (trap) (0-3) B. Appropriate range & level of technological competencies? (sub-system) (0-2)	5
<i>Overall presentation</i>	A. Attractive well presented product?..... (0-4) B. Instructions for use (if needed), controls labelled?..... (0-1)	5

Locomotive Turntable

D

The ability to rotate a locomotive offers a great degree of convenience to railway operators. Design and make a working model of an **electro-mechanically controlled locomotive turntable**. Limit/proximity switches should be incorporated as part of the control system.

Ordinary Level Folder

<i>Analysis of brief</i>	Design should incorporate the following features: Working model of an electro-mechanically controlled locomotive turntable. Must include limit switch control.	5
<i>Investigation of possible solutions</i>	Evidence of investigation: (sketches, photos, etc.) Various types of locomotive turntables and/or relevant mechanical/electronic systems.	5
<i>Design Ideas</i>	Working model of locomotive turntable to satisfy the brief: Sketch of one design shown.	6
<i>Criteria for selection of solution</i>	Valid justification of this idea (at least two reasons).	4
<i>Sketches /drawings for manufacture</i>	Manufacture drawing of the chosen solution and sub-system.	6
<i>Manufacturing sequence/processes</i>	Sequence of events for manufacture of the chosen solution (where a materials list is presented to the exclusion of the manufacturing sequence: 2 marks)	5
<i>Testing and Evaluation</i>	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	5
<i>Presentation of folder</i>	Layout: use of diagrams, sketches, photographs, neat and orderly.	4

Ordinary Level Product

<i>Product satisfies brief</i>	Is the product a locomotive turntable with limit switch controls?	5
<i>Suitability, Functional</i>	Do all the necessary elements of the locomotive turntable function?	5
<i>Design/Inventiveness</i>	Inventive design of the locomotive turntable and sub-system?	5
<i>Originality, commercial comp.</i>	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	5
<i>Appropriateness of materials</i>	Materials selected suited to their respective functions?	5
<i>Appropriate sub-system(s)</i>	Appropriate rotational electro-mechanical sub-system?	5
<i>App. manufacturing processes</i>	Complete locomotive turntable and sub-system manufactured using an appropriate range of processes?	5
<i>Quality of processes</i>	Quality of the product after manufacture?	5
<i>Assembly</i>	Appropriate methods of assembly used? Quality of assembly.	5
<i>Detailed finish/Safety Considerations</i>	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	5
<i>Tech. competencies/ Application of skills</i>	Appropriate level and range of skills/technological competencies?	5
<i>Overall presentation</i>	Attractive, well presented product?	5

Locomotive Turntable

D

The ability to rotate a locomotive offers a great degree of convenience to railway operators. Design and make a working model of an **electro-mechanically controlled locomotive turntable**. Limit/proximity switches should be incorporated as part of the control system.

Higher Level Folder

Analysis of brief	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) A. Locomotive turntable, electro-mechanical with limit switching..... (0-2) B. Design specification generated/list of objectives..... (0-3)	5
Investigation of possible solutions	Evidence of investigation/identification/research: (sketches, photos, etc.) A. Various types of locomotive turntable, (0-3) B. Electro-mechanical sub-systems, various mechanisms & switches.. (0-2)	5
Design Ideas	A. Locomotive turntable design 1 - well sketched & annotated (0-3) B. Locomotive turntable design 2 - well sketched & annotated (0-3)	6
Criteria for selection of solution	A. Selected design identified. (0-1) B. Valid justification of selected design idea and sub-system (0-3)	4
Sketches /drawings for manufacture	Dimensioned/scaled drawings-sketches associated with manufacture. A. Detailed drawings of the chosen solution (0-3) B. Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . (0-3)	6
Manufacturing sequence/processes	A. Sequence of events for manufacture of the chosen solution. (0-2) B. Materials list with sizes and costing..... (0-3)	5
Testing and Evaluation	A. Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation (0-3) B. Possible improvements identified..... (0-2)	5
Presentation of folder	A. Layout: use of diagrams, sketches, photographs, neat and orderly (0-3) B. Correct sequence of presentation as outlined in form S.67 (Design Tasks)... (0-1)	4

Higher Level Product

Product satisfies brief	A. Is the product a locomotive turntable and is it complete? (0-3) B. Does it have limit switch control? (0-2)	5
Suitability, Functional	A. Is the electro-mechanical turntable suitable for use?..... (0-3) B. Do the limit switches work? (0-2)	5
Design/Inventiveness	A. Inventive design of the locomotive turntable and sub-system and/or mock-up of all or part of the solution? (model = 2) (0-5)	5
Originality, commercial comp.	A. Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components? (0-5)	5
Appropriateness of materials	A. Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... (0-5)	5
Appropriate sub-system(s)	A. Appropriate mechanical sub-system? (0-3) B. Appropriate electronic sub-system? (0-2) (Not working max. mark 4)	5
App. manufacturing processes	A. Turntable manufactured using an appropriate range of processes? (0-3) B. sub-system manufactured using an appropriate range of processes? (0-2)	5
Quality of processes	A. Quality of turntable after manufacture..... (0-3) B. Quality of the control system after manufacture?..... (0-2)	5
Assembly	A. Appropriate methods of assembly used? (0-3) B. Quality of assembly (0-2)	5
Detailed finish/Safety Considerations	A. No sharp edges or other safety hazards? (0-3) B. All parts well finished? (0-2)	5
Tech. competencies/ Application of skillss	Does the product demonstrate that the candidate has an: A. Appropriate range & level of technological competencies? (turntable)..... (0-3) B. Appropriate range & level of technological competencies? (sub-system) (0-2)	5
Overall presentation	A. Attractive well presented product?..... (0-4) B. Instructions for use (if needed), controls labelled?..... (0-1)	5

Tablet Stand

E

Design and make a **stand for a small tablet computer**. The design should include tilt and turn functionality with at least one of these movements being **electro-mechanically** controlled.

Ordinary Level Folder

<i>Analysis of brief</i>	Design should incorporate the following features: Stand for a tablet computer. Tilt and turn functionality. One of the movements must be electro-mechanical.	5
<i>Investigation of possible solutions</i>	Evidence of investigation: (sketches, photos, etc.) Various types of tablet stand and/or relevant mechanical/electronic systems.	5
<i>Design Ideas</i>	Tablet Stand to satisfy the brief: Sketch of one design shown.	6
<i>Criteria for selection of solution</i>	Valid justification of this idea (at least two reasons).	4
<i>Sketches /drawings for manufacture</i>	Manufacture drawing of the chosen solution and sub-system.	6
<i>Manufacturing sequence/processes</i>	Sequence of events for manufacture of the chosen solution (where a materials list is presented to the exclusion of the manufacturing sequence: 2 marks)	5
<i>Testing and Evaluation</i>	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	5
<i>Presentation of folder</i>	Layout: use of diagrams, sketches, photographs, neat and orderly.	4

Ordinary Level Product

<i>Product satisfies brief</i>	Is the product a stand for a tablet computer with tilt and turn functionality? Is one of the movements electro-mechanical?	5
<i>Suitability, Functional</i>	Do all the necessary elements of the tablet stand function?	5
<i>Design/Inventiveness</i>	Inventive design of the tablet stand and sub-system?	5
<i>Originality, commercial comp.</i>	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	5
<i>Appropriateness of materials</i>	Materials selected suited to their respective functions?	5
<i>Appropriate sub-system(s)</i>	Appropriate electro-mechanical sub-system with tilt and turn functionality?	5
<i>App. manufacturing processes</i>	Complete tablet stand and sub-system manufactured using an appropriate range of processes?	5
<i>Quality of processes</i>	Quality of the product after manufacture?	5
<i>Assembly</i>	Appropriate methods of assembly used? Quality of assembly.	5
<i>Detailed finish/Safety Considerations</i>	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	5
<i>Tech. competencies/ Application of skills</i>	Appropriate level and range of skills/technological competencies?	5
<i>Overall presentation</i>	Attractive, well presented product?	5

Tablet Stand

E

Design and make a **stand for a small tablet computer**. The design should include tilt and turn functionality with at least one of these movements being **electro-mechanically** controlled.

Higher Level Folder

Analysis of brief	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) A. Tablet computer stand, tilt and turn, one movement electro-mechanical ... (0-2) B. Design specification generated/list of objectives..... (0-3)	5
Investigation of possible solutions	Evidence of investigation/identification/research: (sketches, photos, etc.) A. Various types of tablet computer stands, (0-3) B. Electro-mechanical sub-systems, various mechanisms..... (0-2)	5
Design Ideas	A. Tablet computer stand design 1 - well sketched & annotated (0-3) B. Tablet computer stand design 2 - well sketched & annotated (0-3)	6
Criteria for selection of solution	A. Selected design identified. (0-1) B. Valid justification of selected design idea and sub-system (0-3)	4
Sketches /drawings for manufacture	Dimensioned/scaled drawings-sketches associated with manufacture. A. Detailed drawings of the chosen solution (0-3) B. Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . (0-3)	6
Manufacturing sequence/processes	A. Sequence of events for manufacture of the chosen solution. (0-2) B. Materials list with sizes and costing..... (0-3)	5
Testing and Evaluation	A. Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation (0-3) B. Possible improvements identified..... (0-2)	5
Presentation of folder	A. Layout: use of diagrams, sketches, photographs, neat and orderly (0-3) B. Correct sequence of presentation as outlined in form S.67 (Design Tasks)... (0-1)	4

Higher Level Product

Product satisfies brief	A. Is the product a Tablet stand and is it complete?(0-3) B. Is it designed to tilt and turn with one of these electro-mechanical?(0-2)	5
Suitability, Functional	A. Is the Tablet stand suitable for use?(0-3) B. Does it have tilt and turn functionality with electro-mechanical tilt or turn? (0-2)	5
Design/Inventiveness	A. Inventive design of the Tablet stand and sub-system and/or mock-up of all or part of the solution? (model = 2)(0-5)	5
Originality, commercial comp.	A. Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components?.....(0-5)	5
Appropriateness of materials	A. Materials selected suited to their respective functions? (strong, robust, rigid, etc.).....(0-5)	5
Appropriate sub-system(s)	A. Appropriate mechanical sub-system?(0-3) B. Appropriate electronic sub-system?(0-2) (Not working max. mark 4)	5
App. manufacturing processes	A. Tablet stand manufactured using an appropriate range of processes?(0-3) B. sub-system manufactured using an appropriate range of processes?(0-2)	5
Quality of processes	A. Quality of Tablet stand after manufacture.....(0-3) B. Quality of the control system after manufacture?.....(0-2)	5
Assembly	A. Appropriate methods of assembly used?(0-3) B. Quality of assembly(0-2)	5
Detailed finish/Safety Considerations	A. No sharp edges or other safety hazards?.....(0-3) B. All parts well finished?(0-2)	5
Tech. competencies/ Application of skillss	Does the product demonstrate that the candidate has an: A. Appropriate range & level of technological competencies? (tablet stand)(0-3) B. Appropriate range & level of technological competencies? (sub-system)(0-2)	5
Overall presentation	A. Attractive well presented product?(0-4) B. Instructions for use (if needed), controls labelled?(0-1)	5

Automatic shutter

F

Design and make a **working model of a shutter** for the window of a house. The shutter should open automatically in daylight and close automatically at night.

Ordinary Level Folder

<i>Analysis of brief</i>	Design should incorporate the following features: Working model of a window shutter. It must open automatically in daylight. It must close automatically at night.	5
<i>Investigation of possible solutions</i>	Evidence of investigation: (sketches, photos, etc.) Various types of window shutter and relevant mechanical/electronic systems.	5
<i>Design Ideas</i>	Automatic shutter to satisfy the brief: Sketch of one design shown.	6
<i>Criteria for selection of solution</i>	Valid justification of this idea (at least two reasons).	4
<i>Sketches /drawings for manufacture</i>	Manufacture drawing of the chosen solution and sub-system.	6
<i>Manufacturing sequence/processes</i>	Sequence of events for manufacture of the chosen solution (where a materials list is presented to the exclusion of the manufacturing sequence: 2 marks)	5
<i>Testing and Evaluation</i>	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	5
<i>Presentation of folder</i>	Layout: use of diagrams, sketches, photographs, neat and orderly.	4

Ordinary Level Product

<i>Product satisfies brief</i>	Is the product an automatic shutter for a window designed to open and close in response to light and darkness?	5
<i>Suitability, Functional</i>	Do all the necessary elements of the automatic shutter function?	5
<i>Design/Inventiveness</i>	Inventive design of the automatic shutter and sub-system?	5
<i>Originality, commercial comp.</i>	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	5
<i>Appropriateness of materials</i>	Materials selected suited to their respective functions?	5
<i>Appropriate sub-system(s)</i>	Appropriate electro-mechanical sub-system with light/dark sensing?	5
<i>App. manufacturing processes</i>	Complete automatic shutter and sub-system manufactured using an appropriate range of processes?	5
<i>Quality of processes</i>	Quality of the product after manufacture?	5
<i>Assembly</i>	Appropriate methods of assembly used? Quality of assembly.	5
<i>Detailed finish/Safety Considerations</i>	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	5
<i>Tech. competencies/ Application of skills</i>	Appropriate level and range of skills/technological competencies?	5
<i>Overall presentation</i>	Attractive, well presented product?	5

Automatic Shutter

F

Design and make a **working model of a shutter** for the window of a house. The shutter should open automatically in daylight and close automatically at night.

Higher Level Folder

Analysis of brief	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) A. Shutter, electro-mechanical, automatically controlled in light/dark (0-2) B. Design specification generated/list of objectives..... (0-3)	5
Investigation of possible solutions	Evidence of investigation/identification/research: (sketches, photos, etc.) A. Various types of window shutters, (0-3) B. Automatic control systems, various mechanisms.. (0-2)	5
Design Ideas	A. Automatic shutter design 1 - well sketched & annotated (0-3) B. Automatic shutter design 2 - well sketched & annotated (0-3)	6
Criteria for selection of solution	A. Selected design identified. (0-1) B. Valid justification of selected design idea and sub-system (0-3)	4
Sketches /drawings for manufacture	Dimensioned/scaled drawings-sketches associated with manufacture. A. Detailed drawings of the chosen solution (0-3) B. Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . (0-3)	6
Manufacturing sequence/processes	A. Sequence of events for manufacture of the chosen solution. (0-2) B. Materials list with sizes and costing..... (0-3)	5
Testing and Evaluation	A. Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation (0-3) B. Possible improvements identified..... (0-2)	5
Presentation of folder	A. Layout: use of diagrams, sketches, photographs, neat and orderly (0-3) B. Correct sequence of presentation as outlined in form S.67 (Design Tasks)... (0-1)	4

Higher Level Product

Product satisfies brief	A. Is the product an automatic shutter and is it complete? (0-3) B. Is it designed to open in daylight and close in darkness? (0-2)	5
Suitability, Functional	A. Is the Automatic shutter suitable for use? (0-3) B. Does it open automatically in daylight and close automatically in darkness? (0-2)	5
Design/Inventiveness	A. Inventive design of the automatic shutter and sub-system and/or mock-up of all or part of the solution? (model = 2) (0-5)	5
Originality, commercial comp.	A. Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components? (0-5)	5
Appropriateness of materials	A. Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... (0-5)	5
Appropriate sub-system(s)	A. Appropriate mechanical sub-system? (0-3) B. Appropriate electronic sub-system? (0-2) (Not working max. mark 4)	5
App. manufacturing processes	A. Shutter manufactured using an appropriate range of processes?..... (0-3) B. sub-system manufactured using an appropriate range of processes? (0-2)	5
Quality of processes	A. Quality of shutter system after manufacture..... (0-3) B. Quality of the control system after manufacture?..... (0-2)	5
Assembly	A. Appropriate methods of assembly used? (0-3) B. Quality of assembly (0-2)	5
Detailed finish/Safety Considerations	A. No sharp edges or other safety hazards? (0-3) B. All parts well finished? (0-2)	5
Tech. competencies/ Application of skillss	Does the product demonstrate that the candidate has an: A. Appropriate range & level of technological competencies? (shutter) (0-3) B. Appropriate range & level of technological competencies? (sub-system) (0-2)	5
Overall presentation	A. Attractive well presented product?..... (0-4) B. Instructions for use (if needed), controls labelled?..... (0-1)	5