Please note that
the Syllabi for Form 1 and Form 2
as shown below
have been replaced by a new curriculum
which can be accessed through the
Form 1 and Form 2 Curriculum pages.
Foreword

Dr. Cecilia Borg  Director General

It is with great pleasure that I have accepted to write the foreword of the Design and Technology Syllabus. The teaching of this subject reflects the current trend in the Maltese classroom, and this for a number of reasons.

The dual aspect of the subject, namely the theoretical and the practical side are in line with the present trend in classroom teaching. The doing aspect taught in schools is being enhanced as it is being put on the same footing as the theoretical one. Students will have the opportunity to create, design and construct in given situations which will reflect their ability and skills at using different materials. They will learn the different aspects required to produce and in this manner their entrepreneurship skills are developed.

The pleasure of learning is enhanced due to the multifaceted aspects of the subject matter. The basics of Design and Technology are not new to our classes, but the philosophy of the Subject is. The present syllabus gives the students ample time to achieve this.

Dr. Cecilia Borg

Director General  Education Division
Introduction
Mr Lawrence D. Zammit  Director Technology in Education

At the end of my career it gives me great satisfaction that for the first time the MATSEC Examination Board is offering a SEC qualification in a vocationally oriented subject, Design and Technology. This is a historical milestone in our National Education Reform which will strengthen our national examination system. Students studying Design and Technology will from now on be able to obtain a national certification that recognizes their knowledge and skill in this very important area.

The Ministry of Education has been laying a solid foundation for the success of this new subject. State-of-the-art laboratories are continuing to be set-up in Area Secondary Schools and Junior Lyceums. The human resource aspect has also been addressed and all Design and Technology teachers have been given extensive training in preparation for the introduction of this subject.

The Design and Technology syllabus will prepare our students to actively participate in today’s fast-changing technological environment and to quickly react and adapt to new challenges in their early steps into a world or life-long learning.

Students will experience a distinctive creative process that combines intellectual abilities with practical skills through purposeful practical activities. Through Design and Technology students will have the opportunity of developing their design and production capabilities in combination with the knowledge and understanding of aesthetic, economic, moral, social and the technical aspects involved. All these also integrate a wide range of communication devices including verbal, graphical and modelling skills as well as the skills required to work effectively as part of a team.

Design and Technology has a crucial role in the development of industrial partnerships. The work in school should always reflect what is happening in industry. This is the major reason why CAD/CAM is being embedded in the syllabus. It is becoming increasingly important for students of Design and Technology to have a full understanding of the industrial applications of CAD/CAM and how it is changing work practices and influencing the design process.
Design and Technology will also contribute to better understanding of other subjects such as Science, Mathematics, Art, IT and Business Studies. This gives the opportunity of cross-curricular collaboration between all subject teachers.

To achieve the full benefit of this syllabus, teachers must engage in new pedagogical processes and apply constructivist teaching methodologies. In this respect I am confident that the substantial investment in training and equipment will result in the successful implementation of this subject.

I would like to thank Mr. Charles Spiteri, Educational Officer for Design and Technology and his team for their professional commitment and hard work in preparation of this syllabus.

**Lawrence D. Zammit B.Sc. (Eng.) (Hons.)**

Director  
Department of Technology in Education  
Education Division
DESIGN AND TECHNOLOGY SYLLABUS

The National Minimum Curriculum recognises that developments in Science and Technology are amongst the greatest and most important challenges to be addressed. To meet this challenge Design and Technology is being phased in both the girls and boys Secondary Schools.

The course in Design and Technology leads to the Secondary Education Certificate (SEC) and is therefore based on the syllabus for that examination. The learning context is different from school to school and indeed from student to student. Teachers are aware of this and hence differentiated teaching is indispensable. Provisions in the syllabus allow the teachers to work within its parameters while still not restricting their ingenuity.

It is of great satisfaction for my staff and myself, to be in a position to present this Design and Technology Syllabus. Although indicated as a basic subject in the National Minimum Curriculum it is presently being phased in as an Option in all the State Secondary Schools.

Once offered the subject can be chosen either from Form One (Entry Level) or from the Third Form as an Option. Students who choose the subject at the Entry Level will be allotted two lessons (one double) per week in Forms One and Two, and then four lessons (two double lessons) in Forms Three, Four and Five. Similar to all the other Optional subjects, four lessons (two double lessons) per week in Forms three, four and five are allotted.

Design and Technology will be taught in the Technology Laboratories appropriately equipped for theoretical and practical activities. The maximum number of students per session will not exceed sixteen. The subject will be presented through investigative procedures, planned activities through design and make assignments. Health and Safety measures are an integral part of the subject.

The course will be disseminated through projects using the Design Process and covering the four Areas of Study namely: Electronics, Food, Resistant Materials, and Textiles. Each project is envisaged to take fourteen double lessons from the initial situation to the final evaluation. This means that knowledge on the four Areas of Study will be disseminated in the first and second form and then again during the third and fourth form.
At the end of their fourth form, the students will be presented with a number of situations; at least two from each Area of Study. They choose one for their Extended Project and then, in their fifth form the students must plan and execute the project that will demonstrate their knowledge and understanding of one or more of the four areas of study. The quality of work presented should reflect the student’s ability and skills. The Design Folio and Product produced from their Extended Project will be assessed and considered as their Core Paper for the SEC Examination. The Extended Project will only be assessed if the Design Folio is submitted. The students will also be given ample time for revising the four Areas of Study for which they have to sit at the SEC Examination.

Charles Spiteri
Education Officer (Design and Technology)

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SECTION A: GENERAL INFORMATION

1 INTRODUCTION

1.1 RATIONALE

From the earliest times, humans have interpreted, shaped and altered their environments in an attempt to improve the quality of their lives. In the process, technologies have evolved and been developed to the extent that, today, they have an impact on most aspects of our daily lives.

Our program will prepare students for further studies as today’s knowledge – based economy is calling for qualified employees who hold the right skills to work in the highly dynamic marketplace.

........The teaching of Design and Technology in schools ensures that today’s pupils are suitably prepared to live and work in a technological world. This is fulfilled through the teaching of technical awareness, design methodologies, and the application of problem-solving skills to real life problems. The teaching of Design and Technology stimulates both intellectual and creative skills and develops the personal qualities necessary to ensure that a project is successfully developed from the conceptual stage through the creation of the final product.


Design and Technology is essentially a study of using human ingenuity and creativity to solve real problems, while building the skills and attitudes that will become the tools of that human activity.

The Design and Technology School Curriculum is concerned with learning about and through technology. Design and Technology develops a wide range of skills including those of problem solving, construction, communication, critical thinking, analysis and evaluation. Students are not to produce exactly what has been taught, nor to recite inert knowledge, understanding and skills to new situations. This will be achieved
Design and Technology projects centering around particular themes are done in each form. This will help in making students to become more proactive in the use of technology to solve problems rather than be trainees of isolated skills.

1.2 SYLLABUS AIMS

The aims listed below assist the students to acquire a useful range of relevant and transferable skills that include knowledge, practical skills and application, investigation, attitudes, values and evaluation, appreciation of design and practical work.

The syllabus aims to give students the opportunity to develop their abilities in the area of Design and Technology through:

- Activities involving the designing and making of quality products, whether unique or modified from existing items, to meet specific purposes by addressing the needs, wants and values of the intended users.
- The selection of appropriate resources (information, materials, components, tools and equipment, techniques and processes) according to design problem.
- The safe, correct, effective and efficient use of resources.
- The analysis and evaluation of Design and Technology activity, both their own and the work of others.
- The recognition of social, moral, economic, environmental and health and safety issues inherent in Design and Technology, including the market influences that may be applied.
- Communicating effectively with the different audiences for Design and Technology activity, and to take account of the values of those audiences and market influences through reasoned judgements.
- The encouragement of the personal qualities which are necessary to take a problem to a realised solution.

Note: The above aims are not in a hierarchical order of importance.
1.3 MAIN OBJECTIVE ASSESSMENT

- To analyse situations in which aspects of Design and Technology are used to satisfy the various human needs, making use of available material and resources.
- To research, select, record and apply knowledge and skills which is relevant to the needs and factors identified.
- To use investigative procedures.
- To test and compare methods, materials and equipment;
- To observe, measure and record observations accurately and systematically;
- To interpret evidence in its various forms as a basis for making judgements and choices.
- To justify judgements and choices in the light of evidence.
- To plan a course of action which takes into account the priorities identified.
- To carry out a planned course of action by applying the required skills.
- To test and evaluate outcomes against design brief.

*These objectives form an integral part of the syllabus.*
2 RESISTANT MATERIALS

2.1 RESISTANT MATERIALS

2.1 DESIGNING SKILLS

*Students should be able to:*

1. analyse the situation to identify the need and problem.
2. write a Design Brief with help.
3. research briefly the key words in the Design Brief.
4. understand with help the importance of analysing existing products.
5. write a specification with help mentioning, some basic requirements.
6. generate and record ideas in combination of text and in simple 2D/3D presentation.
7. select with reason and present the chosen idea.
8. make a simple model where applicable to check on the idea’s feasibility. Use correctly modelling materials.
9. write with help a simple proposed work plan.

2.1.2 MAKING SKILLS

*Students should be able to:*

1. select materials and components visually.
2. make use of datum edge.
3. use (safely, accurately and efficiently) marking, measuring, cutting and assembling tools.
4. match and use tools, equipment and processes with materials and components.
5. consider economic use of materials.
6. cut, shape and form materials to specific tolerances.
7. prepare the edges of materials before joining.
8. apply appropriate finishing to the particular material.
2.1.3 EVALUATING SKILLS

Students should be able to:

1. test and evaluate the product against the specification.
2. make a simple evaluation of the Design Process.

2.1.4 KNOWLEDGE AND UNDERSTANDING

Students should be able to:

1. show awareness that materials have different properties
   - Aesthetic: colour, texture, weight, surface finish.
   - Physical: electrical conductivity.
   - Mechanical: elasticity.
2. know that the use of materials can have different effects on society.
   - Pollution, waste management.
3. know about the classification of materials.
   - Ferrous/non ferrous metals
   - Alloys
   - Hard/soft woods
   - Manufactured boards
   - Thermoplastic and thermosetting plastics
4. know that different materials come in standard forms and sizes.
5. know that different materials can be shaped and joined in a variety of ways.
   - Material preparation: marking out and using datum edge.
   - Wasting: drilling, sawing, filing, sanding.
   - Deforming: bending.
   - Fabrication: soldering, nails, and adhesives.
6. know how to prepare for manufacture
   - Ensure economical use of material.
   - Use of appropriate section /size of material.
   - Measure and mark: Rulers, try square, scribers, punches, datum edge.
7. know that appearance, durability, aftercare and quality can be achieved by different finishing processes.
• Painting.
• Varnishing.
• Staining.

8. make use of ICT
  • Computer software (ex. Word)
  • Clipart libraries
  • Scanners
  • Printers

9. know about the products’ effect on society
  • Safety standards.
  • Environmental issues: pollution, waste management, economic use of material.

10. know the criteria how to analyse and evaluate products and processes
  • Use criteria to judge the quality of a product: how it looks, its performance, its function, the needs and values of end users, safety and value for money.

2.1.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar. (with help)
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. use sketches, drawings to communicate ideas (free hand sketching, nets).
5. use colour and texture to enhance ideas.
6. present a simple working drawing to enable the manufacture of a product.
7. use ICT to access, store and retrieve information.
8. present design ideas with the use of 2D and/or 3D models/simulations where appropriate.
9. recognise and use the correct units and symbols.
10. produce a simple work plan.
11. know how to present a system in block diagram in terms of input–process–output.

2.1.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. recognise hazards in the Design and Technology laboratories.
2. understand and apply safe working practices.
3. use protective wear.
4. consider safety when selecting materials.
5. make correct use of safety guards.
6. store and use materials, components, tools and equipment safely.
7. make correct use of dust and fumes extractors where required.
8. know about the risks of hazardous vapours and other substances (use of adhesives).
9. follow manufacturers’ instructions.
10. read, understand and follow safety symbols.
11. dispose of disused products, materials and components in a safe and environmental friendly manner.
12. know the procedures to follow in case of an accident: (cuts, burns and foreign bodies).
2.2 RESISTANT MATERIALS

2.2.1 DESIGNING SKILLS

*Students should be able to:*

1. write the situation with guidance.
2. analyse the situation to identify the need and/or problem.
3. write a Design Brief with minimum assistance.
4. conduct research according to the key words in the Design Brief.
5. research and analyse existing products.
6. produce a specification which reflects the essential features of the Design Brief.
7. generate and record a number of ideas using text and graphic techniques.
8. present the chosen idea using appropriate communication, media, including graphical and ICT skills.
9. make a simple model if required/appropriate.
10. develop a suitable work plan.

2.2.2 MAKING SKILLS

*Students should be able to:*

1. select from a given range, the most appropriate material for a determined purpose.
2. work with various materials and improve on their basic skills in shaping them.
3. use tools and equipment to shape, form, finish materials safely and accurately and finish them appropriately.
4. use finishing techniques to strengthen and improve appearance of their products using a range of equipment/tools.

2.2.3 EVALUATING SKILLS

*Students should be able to:*

1. recognise that modifications during production are sometimes necessary.
2. carry out appropriate tests before making.
3. test and evaluate the product against fitness for purpose and specification.
4. evaluate the design process.

2.2.4 KNOWLEDGE AND UNDERSTANDING

**Students should be able to:**

2.2.4a MATERIALS:

1. show awareness that materials have different properties
   - Physical: thermal properties.
   - Mechanical: strength, hardness, durability.
2. know that the use of materials can have different effects on society.
   - Waste management, pollution
3. know that different materials come in standard forms and sizes.
4. know that different materials can be shaped and joined in a variety of ways.
   - Wasting: grinding,
   - Deforming: laminating, vacuum forming.
   - Fabrication: pop riveting, screws, nuts and bolts, adhesives and welding
5. know how to prepare for manufacture
   - Use of appropriate section /size of material.
   - Measure and mark: squares (centre, mitre).
6. know that appearance, durability, aftercare and quality can be achieved by different finishing processes.
   - Laminating.
   - Waxing.
7. know how to achieve the best use of materials.
   - Matching material to the required form.
8. know about the products` effect on society
   - The importance of product reliability.
9. know the criteria how to analyse and evaluate products and processes
   - Analyse more than one resistant material.
   - Use criteria to judge the quality of a product: how it looks, its performance, its function, the needs and values of end users, safety and value for money.
2.2.4b MECHANISMS:

1. know that a mechanism transforms an input motion and force into a desired output motion and force.
2. know how mechanisms bring about required changes and control movement.

2.2.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar. (with minimum assistance).
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. use sketches and drawings to communicate ideas. (isometric and oblique projections).
5. present a working drawing with some details to enable the manufacture of the product.
6. use ICT to access, store and retrieve information.
7. present design ideas with the use of 3D model simulations where appropriate.
8. present a system indicating input – process – output.
9. recognise and use the correct units and symbols.
10. produce flowcharts and work schedules.

2.2.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. understand and apply safe working practices.
2. consider safety when selecting materials and finishes.
3. store and use materials, tools and equipment safely.
4. know about the risks of hazardous vapours and other substances.
5. know about the use of barrier creams
6. read, understand and follow safety symbols.
7. know the procedure to be followed in case of an accident (burns, scalds and cuts).
2.3 RESISTANT MATERIALS

2.3.1 DESIGNING SKILLS

*Students should be able to:*

1. write a description of the situation.
2. analyse the situation.
3. write a Design Brief.
4. investigate and evaluate a range of familiar products considering how they work, how they are used and the views of people who use them.
5. produce a specification that reflects the essential features of the Design Brief.
6. generate and record several ideas using text, ICT and graphic techniques.
7. present their chosen idea using appropriate communication, media, including graphical and ICT skills.
8. make a model, if required, using appropriate material.
9. develop a suitable work plan.

2.3.2 MAKING SKILLS

*Students should be able to:*

1. decide how and when to use appropriate materials by considering their purpose, tools and equipment available.
2. to join and combine materials accurately to achieve functional results.
3. use tools, equipment and processes to make, single (one off) and quantity products to ensure consistency and accuracy.
4. to join and combine materials and standard components accurately to achieve functional results.
5. to make an appropriate choice of finish to reflect the aesthetic and environmental implication.
2.3.3 EVALUATING SKILLS

_Students should be able to:_

1. test and evaluate the product against specification using subjective and objective criteria.
2. suggest necessary modifications to the product.
3. evaluate in detail the Design process.

2.3.4 KNOWLEDGE AND UNDERSTANDING

_Students should be able to:_

2.3.4a MATERIALS

1. show awareness that materials have different properties
   - Physical: chemical, fusibility.
   - Mechanical: plasticity, ductility, malleability, toughness.
2. know that the use of materials can have different effects on society.
   - Recyclability.
3. know that different materials come in standard forms and sizes.
4. know the processes involved in manufacturing
   - One off.
   - Batch production.
   - Mass production.
5. know that different materials can be shaped and joined in a variety of ways.
   - Wasting: machining (facing, parallel turning and centre drilling).
   - Deforming: press moulding.
   - Reforming: injection moulding, extrusion and casting.
   - Fabrication: brazing, welding, halving joints, knock down joints.
6. know how to prepare for manufacture
   - Measure and mark: callipers (inside, outside, oddleg, vernier).
7. know how to improve material properties by combining
   - Heat treatment: annealing, hardening and tempering.
   - Alloying of metal: brass, high speed steel, solder.
• Manufactured boards: MDF, HDF, chipboard, plywood, blockboard, pine boards.
• GRP (plastic laminate).

8. know that appearance, durability, aftercare and quality can be achieved by
• different finishing processes.
• Polishing.
• Dip coating.

9. know how to achieve the best use of materials.
• Matching the material to the manufacturing process.

10. understand the use of pre-manufactured standard components
• Availability of various sizes.
• Recognise the economic benefits of their use.

11. make use of ICT
• Digital cameras

12. know about the use of computer integrated manufacture
• Fast, accurate and repeatable production processes.
• Recognise that computer systems can control machines and equipment.

13. know about the products’ effect on society
• The moral and social impact of a product.

14. use the appropriate criteria to analyse and evaluate products and processes
• Analyse more than one resistant material.

**2.3.4b MECHANISMS**

1. know how to analyse and describe mechanisms in terms of input - process - output.

2. identify components by their physicals appearance and symbols: wheel and axle, gears, cams, followers, levers belts, pulleys, and shafts.

3. know the practical application of levers: first, second and third class.

4. identify and use symbols to illustrate simple gear trains:-Driver, Idler, driven.

5. know how to calculate simple gear ratio.

6. know about the use of plate cams: disc, pear and heart, snail.
7. know about the use of cam followers: knife, roller and flat.
8. know the importance of control in a production system.
9. identify and describe the following types of motion in mechanical systems: Linear, reciprocating, rotary, and oscillating.
10. know about the use of single acting cylinders in pneumatics: 2 cylinders in a system.

2.3.5 COMMUNICATION

_Students should be able to:_

1. produce documentation with relevant and clear information, that is legible, and having the correct spelling, punctuation and grammar.
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. use sketches and drawings to communicate ideas (1st and 3rd angle orthographic projection).
5. make use of ICT, to present information in graphical and text form.
6. present a detailed working drawing to enable the manufacture of a product.
7. know how to present graphically a system in terms of input – process - output.
8. produce flowcharts, time plans and work schedules.

2.3.6 HEALTH AND SAFETY

_Awareness of health and safety should be shown throughout the Design and Make process._

_Students should be able to:_

1. know about safety in terms of function and product maintenance.
2. understand the need to consider risk assessment.
3. take the necessary precautions in the use and safe disposal of chemicals.
4. understand the need for safe disposal of waste.
5. dispose of disused products, materials and components in a safe and environment friendly way.
6. device a system of control when manufacturing to ensure health and safety.
7. know about the risks of hazardous vapours and other substances.
8. know the procedure to follow in the case of an accident.
9. read, understand and follow safety symbols.
At the end of their fourth Form, the students will be presented with a number of situations; at least two from each Area of Study. They choose one for their Extended Project and then, in their fifth Form the students must plan and execute a project that will demonstrate their knowledge and understanding of one or more of the four areas of study. The quality of work presented should reflect the student’s ability and skills. The Design Folio and Product produced from their Extended Project will be assessed and considered as their Core Paper for the SEC Examination. The Extended Project will only be assessed if the Design Folio is submitted. The students will also be given ample time for revising the four Areas of Study for which they have to sit at the SEC Examination.

**TYPICAL SITUATIONS**

1. Toys or Learning Activity Centres are always popular with young children. A manufacturer intends to produce a toy display item which has some type of action or moving parts built in.

2. Local Councils are promoting recycling of materials. Aluminium dinking cans take up plenty of space in the bringing-in sites and they are being emptied very frequently. The councils wish to minimize the collection costs.
3 ELECTRONICS

3.1 ELECTRONICS FORMS 1 & 2

3.1.1 DESIGNING SKILLS

Students should be able to:

1. analyse the situation to identify the need and problem.
2. write a Design Brief with help.
3. research briefly the key words in the Design Brief.
4. understand with help the importance of analysing existing products.
5. write a specification with help mentioning some basic requirements.
6. generate and record ideas in combination of text and in simple 2D/3D presentation.
7. select with reason and present the chosen idea.
8. make a simple model where applicable to check on the idea’s feasibility. Use correctly modelling materials.
9. write with help a simple proposed work plan.

3.1.2 MAKING SKILLS

Students should be able to:

1. select materials and components visually.
2. make use of datum edge.
3. use (safely, accurately and efficiently) marking, measuring, cutting and assembling tools.
4. match and use tools, equipment and processes with materials and components.
5. consider economic use of materials.
6. cut, shape and form materials to specific tolerances.
7. prepare the edges of materials before joining.
8. apply appropriate finishing to the particular material.
9. use breadboard and construction kits to simulate circuits.
10. mount components appropriately and connect them using loose/soldering technique on Veroboard.

3.1.3 EVALUATING SKILLS

_Students should be able to:_

1. test and evaluate the product against the specification.
2. make a simple evaluation of the Design Process.

3.1.4 KNOWLEDGE AND UNDERSTANDING

_Students should be able to:_

3.1.4a ELECTRONIC COMPONENTS

1. Identify components by appearance.
2. Select the appropriate component/s to particular applications.

**Power supplies**
- know the advantages and disadvantages of different sources of energy:[mains: power supply units; primary (simple cells), secondary and solar (simple cells)] including costs and applications.

**Resistors**
- Know that fixed resistors are used to control voltage and current in a circuit.
- Know the main characteristics of fixed resistor.
- Make use of a resistor colour code to determine the value and tolerance of fixed resistors and select the nearest preferred value.

**Diodes**
- Know that diodes operate as a one way device.
- Know the procedure to identify the anode and cathode of a diode and light emitting diode (LED).
- Know how to check an LED using the digital multimeter.
- Know how to connect a diode and an LED in the correct polarity for operation.
• Know a typical application of a diode. e.g. use a diode as a one way device.

**Components as output devices.**

• Know the basic characteristics of the following components: reed and piezo type buzzers, lamps, fixed and flashing LEDs

**Mechanical and electrical switches**

• Know that a switch is a means of control to achieve functional results.
• Know that the following switches may perform different functions: single pole single throw, single pole double throw, double pole double throw, push to make, push to break, micro, toggle, reed, rotary, slide, rocker arm, latching (on and off).
• Know that switches are current rated.

### 3.1.4b CIRCUIT CONSTRUCTION

1. identify types of diagrams i.e.: block, circuit, component layout.
2. classify materials by their properties (insulators, conductors and semiconductors).
3. describe current as a result of electron flow.
4. use Ohm’s Law for simple calculations.
5. calculate the total resistance of two or more resistors connected in series.
6. know the difference between direct current and alternating current.
7. know the effect of connecting batteries in series (excluding internal resistance).
8. read electronic circuits / systems and identify the input – process - output sections.
9. follow/understand simple circuits to achieve a specified function.
10. build simple circuits using breadboard, veroboard.
11. mount circuit components appropriately on construction kits using either the loose or soldering method.

### 3.1.5 COMMUNICATION

*Students should be able to:*

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar (with help).
2. use the appropriate Design and Make Process terminology.
3. know and use the appropriate terminology for naming and describing
materials, tools, equipment and components.

4. use sketches, drawings to communicate ideas (free hand sketching, nets).

5. use colour to enhance ideas.

6. present a simple working drawing with some details to enable the manufacture of a product.

7. use ICT to access, store and retrieve information.

8. present design ideas with the use of 2D and or 3D models/simulations where appropriate.

9. recognise and use the correct units and symbols.

10. produce a simple work plan.

11. know how to present a system in block diagram in terms of input - process-output.

12. know how to draw electrical circuits and component layouts

3.1.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. recognise hazards in the Design and Technology laboratories.

2. understand and apply safe working practices.

3. use protective wear.

4. consider safety when selecting materials.

5. make correct use of safety guards.

6. store and use materials, components, tools and equipment safely.

7. make the correct use of dust and fumes extractors where required.

8. know the risks of hazardous fumes during soldering

9. follow manufacturers’ instructions.

10. read, understand and follow safety symbol.

11. dispose of disused products, materials and components in a safe and environmental friendly manner.

12. know the procedure to follow in case of an accidents. (cuts, burns, foreign bodies).
3.2 ELECTRONICS

3.2.1 DESIGNING SKILLS

*Students should be able to:*

1. write the situation with guidance.
2. analyse the situation to identify the need and/or problem.
3. write a Design Brief with minimum assistance.
4. conduct research according to the key words in the Design Brief.
5. research and analyse existing products.
6. produce a specification which reflects the essential features of the Design Brief.
7. generate and record a number of ideas using text and graphic techniques.
8. present the chosen idea using appropriate communication, media including graphical and ICT skills.
9. make a simple model if required/appropriate.
10. develop a suitable work plan.

3.2.2 MAKING SKILLS

*Students should be able to:*

1. select from a given range, the most appropriate material for a determined purpose.
2. work with various materials to improve on their basic skills in shaping them.
3. use tools and equipment to shape, form, finish materials safely and accurately and finish them appropriately.
4. use finishing techniques to strengthen and improve appearance of their products using a range of equipment and tools.
5. use ICT for simulation model. E.g. crocodile clips primary.
6. mount components on Vero board (soldering).
3.2.3 EVALUATING SKILLS

*Students should be able to:*

1. recognise that modifications during production are sometimes necessary.
2. carry out appropriate tests before making.
3. test and evaluate the product against fitness for purpose and specification.
4. evaluate the design process

3.2.4 KNOWLEDGE AND UNDERSTANDING

*Students should be able to:*

3.2.4a ELECTRONIC COMPONENTS:

1. Identify components by appearance.
2. Select the appropriate component/s to particular applications.

**Resistors:**
- Know that variable resistors are used to control voltage and current in a circuit.
- Know the main characteristics of the following variable resistors: potentiometers, pre-sets, light dependent resistors and thermistors (temperature dependant component)

**Capacitors:**
- Know that capacitors are electronic components that store electrical charge.
- Know the main characteristics that is common units and working voltage of polarized and non-polarized capacitors:- ceramic, tantalum, polyester and electrolytic.
- Know the precautions to be taken when using polarized and non polarized capacitors. (i.e. voltage rating, polarity).

**Diodes:**
- Know how to check a diode using the digital multimeter.
- Know a typical application of a diode. e.g. Use a diode as a protection component against back e.m.f.
Transistors:
- Identify the leads of a bipolar transistor that is PNP and NPN from diagrams and data sheet.
- Know how to use a transistor as a switching component
- Know how a change in the base to emitter voltage affects the flow of current in a transistor.
- Know how to choose transistor main parameters from data sheet: \( I_c(\text{max}) \), \( V_{ce} \) (max), gain \( h_{fe} \). No calculations.
- Be aware of the importance to regulate temperature in power transistors.
- Know and apply the use of the ‘Darlington Pair’ transistor.

Components as output devices:
- Know the basic characteristics of the following components: bells, loudspeakers and low voltage D.C. motors.

Mechanical and electrical switches:
- Know that relays are used as an interface between electrical circuits.
- Know that the relay coil is voltage rated and the contacts are current rated.
- Use relay as a latch.
- Use relay to provide a reverse polarity.

3.2.4b CIRCUIT CONSTRUCTION:

1. identify types of diagrams i.e.: block, circuit, component layout.
2. use power formula for simple power calculations.
3. calculate the total resistance of two or more resistors connected in parallel.
4. calculate the required resistance value in a potential divider circuit.
5. use digital meter to measure voltage, current, resistance, capacitance, continuity, diode, and transistor current gain.
6. know the effect of connecting batteries in series and parallel (excluding internal resistance).
7. read electronic circuits / systems and identify the input – process - output sections.
8. develop simple circuits to achieve a specified function.
9. use electronics simulation program to explore the effects of changing the values of components in a circuit.
10. use circuit simulation software to test systems and electronic circuits prior testing on breadboards.
11. build simple circuits using breadboard, veroboard and printed circuit board.

3.2.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar (with minimum assistance).
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. use sketches, drawings to communicate ideas including isometric and oblique projections.
5. present a working drawing with details to enable the manufacture of the product.
6. use ICT to access, store and retrieve information.
7. present design ideas with the use of models 3D model simulations where appropriate.
8. present a system in terms of input – process - output as open loop.
9. recognise and use the correct units and symbols.
10. produce a flow chart and/or work schedules.
11. know how to draw electrical and/or electronic circuits.

3.2.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. understand and apply safe working practices and regulations .
2. consider safety when selecting materials and finishes.
3. store and use materials, components, tools and equipment safely.
4. make correct use of fume extractors where required.
5. know about the risks of hazardous vapours and other substances.
6. read, understand and follow safety symbols.
7. know the procedure to be followed in case of an accident (burns, scalds and cuts and foreign bodies).
3.3 ELECTRONICS

FORM 4

3.3.1 DESIGNING SKILLS

Students should be able to:

1. write a description of the situation.
2. analyse the situation.
3. write a Design Brief.
4. investigate and evaluate a range of familiar products consider how they work, how they are used and the views of people who use them.
5. produce a specification that reflects the essential features of the Design Brief.
6. generate and record several ideas using text, ICT and graphic techniques.
7. present the chosen idea using appropriate communication media, including graphical and ICT skills.
8. make a model, if required, using appropriate material.
9. develop a suitable work plan.

3.3.2 MAKING SKILLS

Students should be able to:

1. decide how and when to use appropriate materials by considering their purpose, tools and equipment available.
2. to join and combine materials accurately to achieve functional results.
3. use tools, equipment and processes to make, single (one off) products and quantity products to ensure consistency and accuracy.
4. to join and combine materials and standard components accurately to achieve functional results.
5. to make an appropriate choice of finish to reflect the aesthetic and environmental implication.
6. use ICT for simulation models. E.g. Crocodile clips secondary.
7. mount components on PC board (etching).
3.3.3 EVALUATING SKILLS

Students should be able to:

1. test and evaluate the product against specification using subjective and objective criteria.
2. suggest necessary modifications to the product.
3. evaluate in detail the Design process.

3.3.4 KNOWLEDGE AND UNDERSTANDING

Students should be able to:

3.3.4a ELECTRONIC COMPONENTS

1. Identify components by appearance.
2. Select the appropriate component/s to particular applications.

Capacitors
- Know that capacitors can be used to provide some form of time control.

Diodes
- Know typical applications of a diode. e.g. Use a diode as a protection component against a wrong connection of a d.c supply. (reverse of polarity)

FET’s
- Identify the leads of an FET from diagrams and data sheet.
- Know how and when to use an FET.
- Use FETs in simple circuits.

Integrated Circuits.
- Know what is meant by dual-in-line package.
- Identify the I.C. pin numbers from diagrams and data sheet.
- Know the difference between Monostable and Astable.
- Use the 555 timer to build an Astable to produce output with both equal and unequal mark/space ratio at a range of frequencies.
- Use the 555 timer as a Monostable Circuit.
logic

• know the function of the following gates: AND, OR, NOT, NAND, NOR, XOR.
• construct simple logic circuits using gates in combination to solve logic problems.

3.3.4b CIRCUIT CONSTRUCTION

1. identify types of diagrams i.e.: block, circuit, component layout, logic and flow.
2. know the difference between sinusoidal and square waveform.
3. state the relationship between Frequency and Periodical Time.
4. distinguish between Peak voltage and Peak To Peak voltage.
5. use time constant formula for simple time delays.
6. use digital meter to measure voltage, current, resistance, capacitance, continuity, diode, and transistor current gain.
7. read electronic circuits / systems and identify the input – process - output sections.
8. follow/understand simple circuits to achieve a specified function.
9. use electronics simulation program to explore the effects of changing the values of components in a circuit.
10. use circuit simulation software to test systems and electronic circuits prior testing on breadboards.
11. build simple circuits using breadboard, vero board and printed circuit board.
12. design and make PCBs.
13. construct truth tables for the following gates: AND, OR, NOT, NAND, NOR, XOR.
14. solve simple logic problems using the logic functions in combination.

3.3.5 COMMUNICATION

Students should be able to:

1. produce documentation with relevant and clear information that is legible, having the correct spelling, punctuation and grammar.
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. use sketches, drawings to communicate ideas (1st and 3rd angle orthographic projection).
5. make use of ICT to present information in graphical and text form.
6. present a detailed working drawing to enable the manufacture of a product.
7. know how to present a system with feedback that is closed loop.
8. produce flowcharts, time plans and work schedules.

3.3.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

**Students should be able to:**

1. know about safety in terms of function and product maintenance.
2. understand the need to consider risk assessment.
3. take the necessary precautions in the use and safe disposal of chemicals (etching solution).
4. understand the need for safe disposed of waste.
5. dispose of disused products, materials and components in a safe and environmental friendly way.
6. devise a system of control when manufacturing to ensure health and safety
7. know about the risks of hazardous vapours and other substances.
8. know the procedure to follow in the case of an accident, (chemical burns)
9. read, understand and follow safety symbols.
10. understand and apply safe working practices and regulations.

3.4 ELECTRONICS

FORM 5
At the end of their fourth Form, the students will be presented with a number of situations; at least two from each Area of Study. They choose one for their Extended Project and then, in their fifth Form the students must plan and execute a project that will demonstrate their knowledge and understanding of one or more of the four areas of study. The quality of work presented should reflect the student’s ability and skills. The Design Folio and Product produced from their Extended Project will be assessed and considered as their Core Paper for the SEC Examination. The Extended Project will only be assessed if the Design Folio is submitted. The students will also be given ample time for revising the four Areas of Study for which they have to sit at the SEC Examination.

TYPICAL SITUATIONS

1. Through research it was found that small musical groups have a problem when playing music together. They sometimes start at slightly different times and find it difficult to keep together in the early stages of rehearsals. At present they try to combat this problem with the director counting or the drummer beating his sticks together; but this is not very accurate.

2. Chicken in a farm yard will all go back to the hen house on their own at dusk. Later, the farmer has to close the door to make his hens secure.
4 TEXTILES

4.1 TEXTILES FORMS 1 & 2

4.1.1 DESIGNING SKILLS

_Students should be able to:_

1. analyse the situation to identify the need and problem.
2. write a Design Brief with help.
3. research briefly the key words in the Design Brief.
4. understand with help the importance of analysing existing products.
5. write a specification with help, mentioning some basic requirements.
6. generate and record ideas in combination of text and in simple 2D/3D presentation.
7. select with reason and present the chosen idea.
8. make a simple model where applicable to check on the idea’s feasibility. Use correctly modelling materials.
9. write with help a simple proposed work plan.

4.1.2 MAKING SKILLS

_Students should be able to:_

1. select textile materials and components visually, by their texture and weight.
2. make use of a datum edge.
3. use (safely, accurately and efficiently) marking, measuring, cutting, joining and ironing tools.
4. match and use appropriate tools, equipment and processes with textile materials and components.
5. consider economic use of materials.
6. cut materials to specific tolerances.
7. prepare the edge of materials before joining.
8. assemble item parts appropriately using simple seams.
9. finish product as necessary (pressing).
10. match components with material.
11. make and use templates and patterns for marking out onto fabric economically.

4.1.3 EVALUATING SKILLS

Students should be able to:

1. test and evaluate the product against the specification.
2. make a simple evaluation of the Design Process.

4.1.4 KNOWLEDGE AND UNDERSTANDING

Students should be able to:

4.1.4 MATERIALS:

1. Classify materials.
   - The origin and structure of natural and manufactured fibres such as cotton, linen, wool, silk, polyamides.
   - The conversion of fibres into yarn and fabric, processes such as spinning, weaving, knitting, bonding, laminating.
2. identify the properties that materials need to have to fulfil the identified purpose for a particular situation.
   - Strength, durability, absorbency, elasticity, resiliency.
   - The chemical processes applied to fabrics such as crease resistance, stain resistance, permanent pressing.
3. understand the importance of fabric testing.
   - Carry simple tests on fabric for absorption and stretch.
4. understand how products affect society.
   - Safety standards.
5. understand the processes involved in manufacturing and how manufacturing companies are organised.
   - Custom production (one-off)
• Batch production

6. identify the following textile components and their functions.
   • Fasteners: buttons, hook and eye, zips, press fasteners (press studs), Velcro.
   • Structural components: threads, Vilene, elastic bands.

7. cut, join and shape various materials (fabrics and components) in a variety of ways.
   • Pattern making: taking the measurements.
   • Lay planning: v-fold.
   • Cutting out
   • Joining fabric: seams.
   • Edge finishes: hems, overlock.
   • Adding shape: pleats, gathering.
   • Pressing: Top pressing, under pressing.

8. select the finishing process for appearance, aftercare and quality.
   • Fabric paints: brush, block printing.

9. make use of ICT.
   • Computer software (ex: word).
   • Clipart libraries.
   • Printer.
   • Scanner

10. recognise the importance of accuracy when:
    • Taking measurements.
    • Preparing and making a pattern.
    • Assembling textile products.

11. know about the care requirements of textile products.
    • Care labels; the symbols used and their meaning.

4.1.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar. (with help)
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. use sketches, drawings to communicate ideas (free hand sketching, nets).
5. use colour and texture to enhance ideas.
6. present a simple working drawing to enable the manufacture of a product.
7. use ICT to access, store and retrieve information.
8. present design ideas with the use of 2D an or 3D models where appropriate.
9. recognise and use the correct units and symbols.
10. produce a simple work plan.
11. know what is a system in terms of input – process – output.

4.1.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the design and make process.

Students should be able to:

1. recognise hazards in the Design and Technology laboratories.
2. understand and apply safe working practices and regulations.
3. use protective wear.
4. consider safety when selecting materials.
5. make correct use of safety guards.
6. store and use materials, components, tool and equipment safely.
7. make correct use of dust and fumes extractors where required.
8. know about the risks of hazardous vapours and other substances. (use of adhesives).
9. follow manufacturers’ instructions.
10. read, understand and follow safety symbols.
11. dispose of disused products, materials and components in a safe and environmental friendly manner.
12. know the procedures to follow in case of an accident: (cuts, burns and foreign bodies).
4.2 TEXTILES

4.2.1 DESIGNING SKILLS

_Students should be able to:_

1. write the situation with guidance.
2. analyse the situation to identify the need and/or problem.
3. write a Design Brief with minimum assistance.
4. conduct research according to the key words in the Design Brief.
5. research and analyse existing products.
6. produce a specification which reflects the essential features of the Design Brief.
7. generate and record a number of ideas using text and graphic techniques.
8. present the chosen idea using appropriate communication media, including graphical and ICT skills.
9. make a simple model if required/appropriate
10. develop a suitable work plan.

4.2.2 MAKING SKILLS

_Students should be able to:_

1. select textile materials and components by their appropriate properties
2. use drafting tools to develop and produce a pattern.
3. layout a pattern correctly with the appropriate symbols marked in.
4. prepare materials for making up, allowing for waste and finish in an economical way considering fabric width, grain and one way fabrics.
5. use a range of tools and equipment to carry out a task or process effectively and safely:
   - Cutting: Scissors, shears, craft knives
   - Joining: Domestic Sewing machine, overlock machine, needles, adhesives,
   - Finishing: Irons (steam and dry), use of dyes/colour fast, fabric paint, fabric felt pens
6. select and use a range of accessories appropriate to the product
   - Fastenings
7. apply assembling techniques appropriate to the product:
   - Seams (temporary and permanent),
   - Hems.
   - Facings.
   - Interfacings.
   - Fullness.
   - Gathering.

8. apply finishing techniques appropriate to the product: Ironing and Pressing.

4.2.3 EVALUATING SKILLS

Students should be able to:

1. recognise that modifications during production are sometimes necessary.
2. carry out appropriate tests before making.
3. test and evaluate the product against fitness for purpose and specification.
4. evaluate the design process.

4.2.4 KNOWLEDGE AND UNDERSTANDING

Students should be able to:

4.2.4A MATERIALS

1. Classifying materials
   - The origin and structure of natural and manufactured fibres. (regenerated cellulose fibres, acrylics, polyamides, polyesters, elastanes).
   - How the method of construction can affect the way the fabric reacts.
2. identify the properties that materials need to have to fulfil the identified purpose for a particular situation.
   - Insulation, flammability, reaction to heat, reaction to chemicals, enzymes and bacteria.
• The chemical processes applied to fabrics (shower or water proofing, flame proofing, moth proofing, strengthening, permanent pressing).
• Choosing the most suitable fabric for a specific process (absorbing dyes and paints).

3. understand the importance of fabric testing.
• Simple tests to be carried out on fabric (colour fastness, resistance to abrasion, flammability, stretch).

4. know that the use of materials can have different effects on society
• Pollution/waste management.
• Recycling of textile materials.

5. understand how products affect society.
• The importance of product reliability.
• Moral and social impact of a product.

6. understand the processes involved in manufacturing and how manufacturing companies are organised.
• Batch production
• Mass production

7. identify the following textile components and their functions.
• Fasteners: toggles, laces and eyelets, clips/buckles,
• Structural components: threads, Vilene, interlinings, linings, shoulder pads, elastic bands, bias binding tape, webbing, bond-a-web, boning.
• Decorative components: lace, braids, beads, fringes.

8. cut, join and shape various materials (fabrics and components) in a variety of ways.
• Pattern making: pattern drafting.
• Lay planning: open lay, one way.
• Cutting out
• Joining fabric: seams(butt seam, French seam), adhesives, staples.
• Edge finishes: facings, binding.
• Adding shape: darts, tucks.
• Pressing: the use of steam and vacuum.

9. select the finishing process for appearance, aftercare and quality.
• Dye: tie and dye.
• Fabric paints: stencilling, block printing.
• Final pressing: use of steam and vacuum.

10. know about the use of computer integrated manufacture.
• How ICT can be used in various stages of manufacture.
• understand that a variety of assembly line systems are used in the production of textile products.
• systems of production.

11. understand the care requirements of textile products including the standards to protect consumer.
• Care labels; the symbols used and their meaning.

4.2.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar. (with minimum assistance)
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. use sketches and drawing to communicate ideas including (isometric and oblique projections).
5. present a working drawing with some details to enable the manufacture of the product.
6. use ICT to access, store and retrieve information.
7. present design ideas with the use of 3D model simulations where appropriate.
8. present a system indicating input – process – output.
9. recognise and use the correct units and symbols.
10. produce flowcharts and work schedules.
4.2.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the design and make process.

Students should be able to:

1. understand and apply safe working practices.
2. consider safety when selecting materials and finishes.
3. store and use materials, tools and equipment safely.
4. know about the risks of hazardous vapours and other substances. (use of dying substances and fixatives)
5. take the necessary precautions in the use and safe disposal of chemicals.
6. read, understand and follow safety symbols.
7. know the procedure to be followed in case of an accident: (burns, scalds and cuts).
4.3 TEXTILES

4.3.1 DESIGNING SKILLS

*Students should be able to:*

1. write a description of the situation.
2. analyse the situation.
3. write a Design Brief.
4. investigate and evaluate a range of familiar products considering how they work, how they are used and the views of people who use them.
5. produce a specification that reflects the essential features of the Design Brief.
6. generate and record several ideas using text, ICT and graphic techniques.
7. present the chosen idea using any appropriate communication, media, including graphical and ICT skills.
8. make a model, if required, using appropriate material.
9. develop a suitable work plan.

4.3.2 MAKING SKILLS

*Students should be able to:*

1. select textile materials and components by their appropriate properties.
2. use drafting tools to develop and produce a pattern.
3. layout a pattern correctly with the appropriate symbols marked in.
4. use tools, equipment and processes to make single (one off) and quantity products to ensure consistency and accuracy.
5. prepare materials for making up, allowing for waste and finish in an economical way considering fabric width, grain and one way fabrics, checked, striped, pattern lays.
6. use a range of tools and equipment to carry out a task or process effectively and safely:
   - Cutting: Scissors, shears, craft knives
   - Joining: Domestic Sewing machine, overlock machine, needles, adhesives, stapler.

7. select and use a range of accessories appropriate to the product:
   • Fastening
   • Decorative
   • Functional

8. apply assembling techniques appropriate to the product.
   • Seams (temporary and permanent)
   • Hems
   • Facings
   • Interfacings
   • Fullness
   • Gathering.

9. apply decorating techniques appropriate to the product: quilting, applique, embroidery.

10. apply finishing techniques appropriate to the product: Ironing and Pressing.

4.3.3 EVALUATING SKILLS

Students should be able to:

1. test and evaluate the product against specification using subjective and objective criteria.
2. suggest necessary modifications to the product.
3. evaluate in details the Design process.

4.3.4 KNOWLEDGE AND UNDERSTANDING

Students should be able to:

MATERIALS

1. Classify materials.
   • Fibres and yarns can be mixed and blended, and fabrics can be bonded to enhance both physical and aesthetic properties.
2. identify the properties that materials need to have to fulfil the identified purpose for a particular situation.
   • Physical processes such as, texturing, bulking, piling.
3. know that the use of materials can have different effects on society
   • The use of waste to create new fabrics.
4. understand how products affect society.
   • Environmental issues: pollution, waste management, economic use of material.
5. understand the processes involved in manufacturing and how manufacturing companies are organised.
   • Mass production
6. identify the following textile components and their functions.
   • Decorative components: embroidery and appliqué motifs, sequins.
7. cut, join and shape various materials (fabrics and components) in a variety of ways.
   • Pattern making: pattern markings.
   • Lay planning.
   • Cutting out.
   • Joining fabric: Inserted seam, Lapped felled seam, Bound seam.
   • Edge finishes: waistband, collars and cuffs.
   • Adding shape: the use of interfacings.
   • Pressing.
8. select the finishing process for appearance, aftercare and quality.
   • Dye: tie and dye, tritik, batik.
   • Fabric paints: brush, airbrushes, stencilling, block printing, silk painting.
   • Appliqué’ and Embroidery: fabric, beads, sequins.
   • Dimensional fabric paints (image transfer).
   • Final pressing: use of steam and vacuum.
9. know about the use of computer integrated manufacture.
   • How a designer in the textiles industry uses CAD.
   • How CAD/CAM to decorate the surface of fabrics (Direct Digital Printing).
10. know that mechanical or computerised equipment can be used on a
production line system.

- How CAM can help to speed up the production process in the: cutting room, assembly line and pressing room.
- The need to process information database for systems to function.
- Stock control.

11. understand that a variety of assembly line systems are used in the production of textile products

- The use of a ticketing system to ensure correct assembly of product parts.
- The correct colour and weight match of components to satisfy production demands of a product.

12. know that a system may have costs involved in its operation, including labour cost, energy and overheads.

13. know the importance of Market Research involving:

- Use of statistics based on scientific principles.
- Testing and analysis the materials and components.

14. understand the standards that can be set during manufacture, to ensure quality control and methods to monitor them.

15. know the care requirements of textile products.

4.4.5 COMMUNICATION

**Students should be able to:**

1. produce documentation with relevant and clear information, that is legible, and having the correct spelling, punctuation and grammar.
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. make use of ICT to present information in graphical and text form.
5. present a detailed working drawing to enable the manufacture of a product.
6. know how to present graphically a system in terms of input – process - output.
7. produce flowcharts, time plans and work schedules.
4.3.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

**Students should be able to:**

1. know about safety in terms of function and product maintenance.
2. understand the need to consider risk assessment.
3. take the necessary precautions in the use and safe disposed of chemicals.
4. device a system of control when manufacturing to ensure health and safety.
5. know about the risks of hazardous vapours and the substances.
6. know the procedure to be followed in case of an accident: (burns, scalds and cuts.)
At the end of their fourth Form, the students will be presented with a number of situations; at least two from each Area of Study. They choose one for their Extended Project and then, in their fifth Form the students must plan and execute a project that will demonstrate their knowledge and understanding of one or more of the four areas of study. The quality of work presented should reflect the student’s ability and skills. The Design Folio and Product produced from their Extended Project will be assessed and considered as their Core Paper for the SEC Examination. The Extended Project will only be assessed if the Design Folio is submitted. The students will also be given ample time for revising the four Areas of Study for which they have to sit at the SEC Examination.

**TYPICAL SITUATIONS**

1. Mountain biking is a popular activity for many young people today. Carrying food and protective/spare clothing for the day could make the biker uncomfortable and unstable. Investigate the possibilities for marketing a textile product solution.

2. A local school safety officer is working with a local textile manufacturer to produce a range of textile products that will serve the purpose of protecting children from traffic accidents. As a designer you have been asked to put forward your idea and to make up a prototype. You are to design for manufacturing in quantity.
5. FOOD

5.1 FOOD

5.1.1 DESIGNING SKILLS

*Students should be able to:*

1. analyse the situation to identify the need and problem.
2. write a Design Brief with help.
3. research briefly the keywords in the Design Brief.
4. understand with help, the importance of analysing existing products.
5. write a specification with help mentioning some basic requirements.
6. generate and record ideas in combination of text and in simple 2D/3D presentation.
7. select with reason and present the chosen idea.
8. make simple modelling or working drawings to design the physical appearance of the product.
9. write with help a simple proposed work plan. (including a list of ingredients, equipment and the actual work plan highlighting simple safety checks).

5.5.2 MAKING SKILLS

*Students should be able to:*

1. select ingredients and other foodstuff visually.
2. use (safely, hygienically, accurately and efficiently) measuring, cutting, chopping, shaping and mixing equipment and cooking / preserving equipment.
3. utilise one or more of these cooking methods: boiling, poaching, grilling, steaming, dry/shallow/stir frying.
4. use appropriate utensils and equipment for specific ingredients.
5. use the appropriate processes and skills in the preparation of the food product.
6. follow the appropriate biotechnological process to make yoghurt.
7. make the food product.

5.5.3 EVALUATING SKILLS

*Students should be able to:*

1. test and evaluate the product against the specification criteria.
2. make a simple evaluation of the Design Process.
3. conduct Simple Sensory Analysis Tests:
   - simple Tasting Panels.
   - a basic Rating Test.

5.5.4 KNOWLEDGE AND UNDERSTANDING

*Students should be able to:*

5.1.4a MATERIALS:

1. list and explain the dietary guidelines and the Food Guide Pyramid:
   - the four basic dietary guidelines: eat less fat, eat less sugar, eat less salt, eat more fibre
2. know the five nutrients found in food and their main function and identify sources of each nutrient:
   - *proteins* (growth and repair),
   - *carbohydrates* (energy),
   - *fats* (insulation, energy),
   - *vitamins* (general health e.g. eyes, bones, fight infections, protection from disease),
   - *minerals* (general health e.g. eyes, bones, protection from disease).
3. identify basic food characteristics:
   - appearance, (e.g. colours, glossy, dull, shiny, pale, dark).
   - texture (e.g. crisp, soggy, crusty, soft, tough, hard, lumpy, smooth,
   - squishy, creamy, watery, buttery, light, rich, thick, thin, seedy).
   - taste (e.g. spicy, salty, sweet, fatty, peppery, hot, chilli, fiery, tangy,
• bitter, herbal, cheesy, tasty, rancid, sour, stale, rotten, fresh).
• aroma (smell).

4. know that all food is produced from ingredients, known as components in the food industry.
• identify primary food, secondary food
• list two different methods of processing (primary processing, secondary processing), which allow the development from one group to the next group of foods.

5. name and use a wide range of equipment, appliances, processes and skills hygienically, effectively and safely to prepare food using the following basic skills:
• measure/weigh,
• cut,
• chop,
• shape (dice, cube, slice etc.),
• peel,
• shred, grate and form foodstuffs,
• mix,
• spread,
• apply appropriate finishing. (garnishing).

6. understand the properties of food when combining, mixing and shaping food items. (e.g. stirring ingredients for a bread filling; combining ingredients for dips or paste).

7. identify and select the appropriate storage, serving and packaging of ingredients and food products considering hygiene, aesthetic and environmental factors.
• select appropriate storage (refrigerator, freezer, room temperature) for different ingredients and food products.
• know why packaging is necessary.
• list different types of packaging available, their advantages and disadvantages.
• choose the packaging material appropriate to the properties of food to be packed. (also considering hygiene and aesthetics)
• choose cost effective and environmentally friendly packaging.

8. know the meaning of the commercial production methods:
9. describe in basic terms the relationship between energy needs and food intake including lack and excess intake.

- carbohydrates, fats and proteins provide energy which both the physical body and mind need to function properly.
- different people require different energy needs depending on sex, age, lifestyle (active or sedentary), special requirements (e.g. pregnancy, athletes, elderly…)
- lack of food leads to lack of energy which may cause many physical and mental problems e.g. underweight and lack of concentration.
- excessive intake of energy-dense food leads to an excess of energy which may cause serious problems very common in the Maltese islands e.g. overweight and obesity.

**5.1.4b BIOTECHNOLOGY:**

1. know what is biotechnology.
2. know that certain food processes are carried out by micro-organisms to produce a novel food.
3. describe and conduct the application of a biotechnological process to produce the dairy product yoghurt:
   - highlight that bacteria help to convert milk into yoghurt through a fermentation process.
   - know what is the function of the starter culture (in this case bacteria from purchased live yoghurt).
   - list equipment and ingredients required.
   - explain the importance of food safety and food lab hygiene throughout any biotechnological process.
   - describe the biotechnological process used to make yoghurt including storage of final product.
5.1.5 COMMUNICATION

*Students should be able to:*

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar (with help).
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing equipment and components (ingredients).
4. use sketches and drawings to communicate ideas.
5. use colour and texture to enhance ideas.
6. present a simple working drawing to enable the making of a product.
7. use ICT to access, store and retrieve information.
8. present design ideas with the use of 2D and 3D sketches.
9. recognise and use the correct units and symbols appropriately: Metric measurement: g, kg, ml, l.
10. produce a simple work plan. (including safety checks)
11. know what is a simple block diagram indicating input – process - output.

5.1.6 HEALTH AND SAFETY

*Awareness of health and safety should be shown throughout the Design and Make process.*

*Students should be able to:*

1. recognise hazards in the food lab.
2. understand and apply safe working practices and regulations.
3. use protective wear: headgear, apron, oven gloves.
4. know and practise the safe and correct use and storage of equipment.
5. identify three basic causes of food contamination and their prevention, eg. inattention to personal hygiene, high risk foods e.g. meat, milk left at room temperature.
6. know and apply safe and hygienic practices when preparing, cooking, serving, storing and packaging foodstuffs.
7. know and apply safe and hygienic practices when washing and caring for equipment and appliances.

8. dispose of waste appropriately and in an environmentally friendly manner (separation of waste at source).

9. know the procedure to follow in case of an accident: Burns and scalds, cuts.
5.2 FOOD

5.2.1 DESIGNING SKILLS

_Students should be able to:_

1. write the situation with guidance.
2. analyse the situation to identify the need and/or problem.
3. write a Design Brief with minimum assistance.
4. conduct research according to the key words in the Design Brief.
5. research and analyse existing products.
6. produce a specification which reflects the essential features of the Design Brief.
7. generate and record a number of ideas using text and graphic techniques.
8. present the chosen idea using appropriate communication, media, including graphical and ICT skills.
9. develop a suitable work plan. (including safety checks).

5.2.2 MAKING SKILLS

_Students should be able to:_

1. select the suitable ingredients and equipment.
2. measure and/or weigh ingredients correctly.
3. use appropriate utensils and equipment, safely, hygienically, accurately and efficiently, for different processes.
4. use appropriately processes and skills in the preparation of chosen food products.
5. practice the basic skills of pastry making: sifting of dry ingredients, rubbing in fat, binding, kneading, resting and rolling out.
6. follow the appropriate biotechnological process to make cheeselets (ġbejniet)
7. make the food product.
5.2.3 EVALUATING SKILLS

_Students should be able to:_

1. recognise that modifications during production are sometimes necessary.
2. test and evaluate the product against fitness for purpose and specification.
3. evaluate the design process.
4. evaluate their final product by designing and using Sensory Analysis Test:
   - simple Tasting Panels.
   - a basic Rating Test.

5.2.4 KNOWLEDGE AND UNDERSTANDING

_Students should be able to:_

5.2.4a MATERIALS:

1. name and describe the five nutrients, their functions and sources in the body; proteins (plant and animal), carbohydrates (sugars, starches and fibre), fats (animal and plant), iv) vitamins (A, D, E, K, B, C), minerals (calcium, iron).
2. know the correct and safe use of the
   - refrigerator: appropriate temperature, correct positioning of different ingredients in the refrigerator, efficient and effective use (e.g. keeping all food covered, avoiding repeated opening and closing of door…)
   - freezer: different types (chest, upright, fridge freezer), appropriate temperature, freezing fresh food, blanching, defrosting food safely, frozen foods (quality, nutrition, price), freezer symbols (star rating, fast freeze), efficient and effective use (e.g. packaging and labelling, correct equipment…)
   - cooker: different types (gas, electric), three main parts (hobs, grill, oven), controls, safety (e.g. shut off gas detecting system i.e. gas supply automatically ceases if flame is cut off, oven gloves…), symbols (Gas Marks / Celsius), convection ovens (shelving positions) in comparison to fan ovens, efficient and effective use (e.g. cooking times, batch baking, safe equipment for hobs, grill, oven…)
• microwave oven: principles behind microwave cookery, microwave radiation (electromagnetic waves), important basic parts of the microwave oven, cooking, reheating and defrosting, safety (e.g. microwave Oven Safety Standard, standing time...), advantages and disadvantages microwave ovens, efficient and effective use (e.g. cooking times, suitable equipment...)

3. know the basic skills involved in making shortcrust pastry: weighing and measuring, sifting, rubbing in, binding, kneading, resting and rolling out.

4. working with and understand the properties of ingredients through:
   • Methods of Combining: **sieving** dry ingredients
     *rubbing* fat into flour: combining fat and starch.
   • Methods of Binding: *adding liquid*
   • Shaping: **rolling and folding** - pastry
     *by hand* - pastry, filling
     **moulds**: equipment used (e.g. pastry tin/flan case/pie dish)
     **casting**: edible layer on outside of product e.g. pastry holding filling as in the case of lemon meringue pie, flans, cheesecakes.

5. identify the correct procedure to freeze and thaw pastry.
   • use appropriate packaging and labelling
   • quick Freeze function
   • safe and appropriate thawing
   • freezing raw or cooked pastry

6. know the appropriate use of ovens to bake the pastry product, including;
   microwave, convection ovens (electrical and gas - shelving positions) and fan ovens (electrical and gas), temperature and timing.

7. know the correct and safe method for cooling.

8. know how to test and/or identify whether a food product is well baked.

9. list, describe and explain different food packaging and select suitable packaging, e.g. paper, cardboard, plastic for the food product, considering cost effectiveness, hygiene, aesthetic and environmental factors.

10. know how the food product could be produced in single, batch or mass production.
11. know the energy value of Proteins, Carbohydrates and fats and calculate the
energy value of the product.
12. describe simply how heat is transferred in the conventional and microwave
oven by
   • conduction.
   • convection.
   • radiation.

5.2.4b BIOTECHNOLOGY:

1. know the basic underlining biotechnological process in the making of cheeselets
   (ġbejniet).
2. explain the importance of food safety and food lab hygiene throughout any
   biotechnological processes.
3. know the different coagulating agents utilized for this process.
4. make basic plain ġbejniet hygienically using appropriate equipment.
5. outline various additions that can be used to alter the flavour of this food product.
6. know that ġbejniet are a healthy, low-fat, high-calcium traditional Maltese product.

5.2.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible,
   having correct spelling, punctuation and grammar (with minimum assistance).
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing the function
   of equipment, components (ingredients) and cooking skills.
4. use sketches and drawings to communicate ideas.
5. present a working drawing to enable the manufacture of the product.
6. use ICT to access, store and retrieve information.
7. present a system in a block diagram. (indicating input – process – output)
8. recognise and use the correct units and symbols eg. Freezer star rating,
   microwave symbol and energy (kcal, kJ).
9. produce a work plan including safety checks.

5.2.6 HEALTH AND SAFETY

*Students should be able to:*

1. consider the importance of safe and hygienic practices in the preparation, cooking, serving, storage, packaging and transportation of foodstuffs to include:
   - unsafe thawing and refreezing of food can result in food spoilage.
   - unhygienic refrigeration (e.g. uncovered food, blood dripping on other foods…) may result in cross contamination.
   - inadequate reheating of food may result in contamination.
   - cooking food to appropriate temperatures and for appropriate timing.
   - importance of personal hygiene.
2. identify causes of food contamination and their prevention.
3. define cross contamination, food spoilage, food hygiene, food safety.
4. know about HACCP food safety legislation for the food industry and consumer.
5. know the procedure to follow in case of an accident: Burns and scalds, cuts.
5.3 FOOD

5.3.1 DESIGNING SKILLS

*Students should be able to:*

1. write a description of the situation.
2. analyse the situation.
3. write a Design Brief.
4. investigate and evaluate a range of familiar products considering how they work, how they are used and the views of people who use them.
5. produce a specification that reflects the essential features of the Design Brief.
6. generate and record several ideas using text, ICT and graphic techniques.
7. present the chosen idea using appropriate communication, media, including graphical and ICT skills.
8. develop a suitable work plan (including the safety and quality checks).

5.3.2 MAKING SKILLS

*Students should be able to:*

1. select suitable ingredients and equipment.
2. use appropriate utensils and equipment, safely, hygienically, accurately and efficiently, for different processes.
3. use appropriately processes and skills in the preparation of chosen food products.
4. make the food products using appropriate culinary processes and skills efficiently and effectively, utilising appropriate utensils and equipment.
5. practice the basic skills of making yeast dough: sifting of dry ingredients, mixing, binding, kneading, resting and rolling out.
6. follow appropriate biotechnological process to make a yeast product.
5.3.3 EVALUATING SKILLS

**Students should be able to:**

1. test and evaluate the product against specification using subjective and objective criteria.
   - evaluate whether materials and resources have been used efficiently, effectively and safely.
   - use criteria to analyse the quality of the product: flavour, colour, shape, volume, texture, health (calculating nutritional analysis of the food product), value for money, fitness for purpose, time management, aesthetics.
2. suggest necessary modifications to the product.
3. evaluate in detail the Design Process.
4. evaluate the final product by designing and using Sensory Analysis Testing.
   - Tasting Panels.
   - a Rating Test.
   - Star Diagrams.

5.3.4 KNOWLEDGE AND UNDERSTANDING

**Students should be able to:**

5.5.4a MATERIALS:

1. explain how all food is produced from ingredients, known as components in the food industry.
   - identify primary food, secondary food, tertiary food.
   - list the three different methods of processing (primary processing, secondary processing, tertiary processing), which allow the development from one group to the next group of foods.
2. be aware of the factors that affect people’s choice of food: taste, price, time, cooking skills, cooking equipment available, religion, culture/tradition, environmental factors, special dietary needs and requirements, advertisements/ influence of other people.
3. be able to plan suitable meals for people of various age groups and who have different dietary conditions. Planning suitable meals for: young children, pregnant women, adolescents, elderly citizens, people suffering from coronary heart disease (low saturated fat meals), people on a slimming diet, people suffering from high blood pressure (low salt meals), people suffering from osteoporosis / osteomalacia (high calcium meals), high fibre meals for people suffering from constipation and related disorders, vegetarians.

4. identify the opportunities for recipe development and modification to produce new products and products suitable for individuals with special dietary needs.

5. know and scientifically understand the relationship between the composition, structure, characteristics and properties of food and the way in which it is prepared and cooked using different cooking methods:
   - moist methods of cooking: boiling, simmering, poaching, steaming, pressure cookery, slow cookers, stewing and braising.
   - dry methods of cooking: baking, roasting, grilling and barbecuing.
   - frying: deep frying, shallow frying, dry frying and stir frying.
   - microwave cooking.
   - revise simple principles underlying heat transfer by conduction, convection and radiation.

6. understand the properties and working characteristics of food as a material and how different functional properties affect the finished products:
   - thickening using thickeners (flour, potatoes, eggs).
   - setting using setting agents (gelatine, cornflour, rennet e.g. cheeselets).
   - fermentation (yeast).
   - fortification with vitamins / minerals to enrich product (commercially).
   - tenderising (marinating e.g. meat and aging e.g. cheese).
   - aeration: mechanical (e.g. beating, sieving, whisking, folding, rubbing-in), chemical using raising agents (baking powder, yeast), steam.
   - coating (breadcrumbs, batters and sugar).
   - glazing to add attractive finishes to products improving texture and appearance.
   - binding: water and milk (e.g. for pastry, dough), eggs, flour and breadcrumbs.
• shortening (fat in baked goods to make them soft and crumble)

7. define and understand why food is preserved; name and briefly explain the methods used for preservation of food at an industrial and domestic level:
   • dehydration: sun drying, spray drying, fluidised-bed drying, roller drying, accelerated freeze drying (AFD).
   • heating: sterilisation, UHT, pasteurisation, canning and bottling.
   • Reduction of temperature: refrigeration, chilling, cook-chilling, freezing (domestic freezing, plate freezing, blast freezing, immersion freezing, cryogenic freezing).
   • addition of chemical preservatives: additives (industrially), salt, acids (vinegar, sugar)
   • irradiation
   • removal of air: vacuum packing, modified atmospheric packaging

8. know how to test whether food product is ready.

9. list, explain and use current legislation with regard to food labelling.

10. know the correct method for planning, preparing, cooking, cooling and/or cooling and/or refrigerating and/or freezing, packaging, labelling, storing and if applicable transportation of the food product.

11. select suitable packaging for food products considering hygiene, aesthetic and environmental factors (reducing, reusing, recycling, refilling).
   • know why packaging is necessary.
   • list different types of packaging available
   • choose the packaging material appropriate to the properties of food to be packed. (also considering hygiene and aesthetics)
   • choose cost effective and environmentally friendly packaging.
   • apply the correct labelling requirements according to local legislation.

12. know how the food product could be produced in single, batch or mass production.

13. devise strategies to make effective use of available time and resources: analysing ideas against specification guidelines, list of ingredients (with quantities) and equipment / appliances, work plan, planning, time schedules, costing.

14. understand that quality control is a necessary part of production and marketing: identify quality control points, review work at all quality production points, apply quality assurance techniques.
15. understand that safety control is a necessary part of production and marketing: Hazard Analysis Critical Control Points (HACCP).
   • identify and analyse hazards and critical control points,
   • review work at all critical production points,
   • apply safety assurance techniques
16. understand the relevance of function and aesthetics (ergonomic, sensory and functional consideration) of design ideas: i.e. taste, texture, appearance and aroma.

**5.5.4b BIOTECHNOLOGY**

1. know the basic underlining biotechnological process in the making of yeast cookery.
2. know simple underlining processes of the fermentation process for the making of: bread and other yeast products.
3. make bread and yeast products hygienically using appropriate equipment.

**5.3.5 COMMUNICATION**

*Students should be able to:*

1. produce documentation with relevant and clear information, that is legible, having correct spelling, punctuation and grammar.
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology to name and describe the function of equipment, components (ingredients) and cooking skills.
4. use sketches and drawings to communicate ideas.
5. make use of ICT to present information in graphical and text form.
6. produce a work plan (including quality and safety checks).
5.3.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. understand the importance of safe and hygienic practices in the preparation, cooking, serving, storage, packaging and transportation of foodstuffs.
2. recognise common safety symbols.
3. recognise causes of food contamination and know how to prevent them:
4. describe simply the process of food spoilage: explain the contamination of food through natural decay and through micro organisms.
5. name the three main micro organisms causing food spoilage (bacteria, moulds, yeasts).
6. list the four conditions required for the growth of micro organisms (food, time, adequate temperature, moisture) and how changes in these conditions will affect the growth and reproduction rate of micro organisms.
7. describe how acids react with micro organisms.
8. describe how food poisoning occurs and ways of how to prevent it through safe and hygienic practices in food labs and following current legislations in this regard.
9. define the following terminology: cross contamination, danger zone, high-risk foods, low-risk areas, high-risk areas, hazard analysis, critical control points, HACCP.
10. define and follow the different datemarks of food items: use by, best before, display by, expires by.
11. apply health and safety principles throughout the process of food preparation, production, serving, cooling, storage, packaging and preservation according to steps of HACCP:
   - identify the hazards,
   - identify the Critical Control Points (CCPs),
   - establish preventive measures,
   - follow Critical Control Points during production,
   - correct problems if necessary,
   - ensure safety checks are correct,
• keep records in work plan as safety checks.
12. choose and know about environmentally friendly products: minimum packaging, recycled packaging, ozone friendly, biodegradable products.
13. know the procedure to follow in case of an accident: burns and scalds, cuts.
At the end of their fourth Form, the students will be presented with a number of situations; at least two from each Area of Study. They choose one for their Extended Project and then, in their fifth Form the students must plan and execute a project that will demonstrate their knowledge and understanding of one or more of the four areas of study. The quality of work presented should reflect the student’s ability and skills. The Design Folio and Product produced from their Extended Project will be assessed and considered as their Core Paper for the SEC Examination. The Extended Project will only be assessed if the Design Folio is submitted. The students will also be given ample time for revising the four Areas of Study for which they have to sit at the SEC Examination.

**TYPICAL SITUATIONS**

1. A new airline catering company has recently been set up near Malta International Airport (MIA) to cater for different airlines. The meals must be suitable for the requirements of airline travel and also include varieties to cater for the special passenger needs i.e. vegetarians and Islamic travellers.

2. A local confectionery discovered that his sales are dropping and profits are decreasing. A main reason for this is that his sweets tend to be high in fats and sugars and a large percentage of his consumers are now more health conscious. The confectioner has decided to launch an innovative line of sweets.
6 RESISTANT MATERIALS

6.1 RESISTANT MATERIALS

6.1.1 DESIGNING SKILLS

_Students should be able to:_

1. analyse the situation to identify the need and problem. (with assistance).
2. write a design brief with minimum assistance
3. research briefly the key words in the Design Brief.
4. research analyse existing products.
5. write a specification with help mentioning some basic requirements.
6. generate and record a number of ideas in combination of text and graphic techniques.
7. select with reason and present the chosen idea.
8. make simple modelling to check on the idea’s feasibility and use correctly modelling materials.
9. write with help a simple proposed work plan.

6.1.2 MAKING SKILLS

_Students should be able to:_

1. select appropriate materials from a given range and identify components visually.
2. make use of datum edge.
3. use (safely, accurately and efficiently) marking, measuring, cutting and assembling tools.
4. match and use tools, equipment and processes with materials and components.
5. consider economic use of materials.
6. cut, shape and form materials to specific tolerances.
7. prepare the edges of materials before joining.
8. apply appropriate finishing to the particular material.
6.1.3 EVALUATING SKILLS

_Students should be able to:_

1. recognize that modifications during production are sometimes necessary.
2. test and evaluate the product against fitness for purpose and specification.
3. evaluate the design process.

6.1.4 KNOWLEDGE AND UNDERSTANDING

_Students should be able to:_

**6.1.4a MATERIALS:**

1. show awareness that materials have different properties
   - Aesthetic: colour, texture, weight, surface finish.
   - Physical: electrical conductivity and thermal conductivity.
   - Mechanical: elasticity, ductility and hardness.
2. know that the use of materials can have different effects on society.
   - Pollution waste
3. know about the classification of materials.
   - Ferrous/non ferrous metals
   - Alloys
   - Hard/soft woods
   - Manufactured boards
   - Thermoplastic and thermosetting plastics
4. know that different materials come in standard forms and sizes.
5. know that different materials can be shaped and joined in a variety of ways.
   - Material preparation: marking out and using datum edge.
   - Wasting: drilling, sawing, filing, sanding.
   - Deforming: bending and vacuum forming.
   - Fabrication: soldering, nails, adhesives, screws, bolts and nuts.
6. know how to prepare for manufacture
   - Ensure economical use of material.
   - Use of appropriate section /size of material.
• Measure and mark: rulers, try square, scribers, punches, datum edge.
7. know that appearance, durability, aftercare and quality can be achieved by different finishing processes.
• painting.
• varnishing.
• staining.
8. make use of ICT
   computer software (ex. Word)
   • clipart libraries
   • scanners
   • printers
9. know about the products’ effect on society
   • safety standards.
   • environmental issues: pollution, waste management, economic use of material.
10. know the criteria how to analyse and evaluate products and processes
   • use criteria to judge the quality of a product: how it looks, its performance, its function, the needs and values of end users, safety and value for money.
11. know how to achieve the best use of materials
   • matching material to the desired form.

6.1.4b MECHANISMS:

1. know that a mechanism transforms an input motion and force into a desired output motion and force.
2. know how mechanisms bring about required changes and control movement.

6.1.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar,(with minimum assistance)
2. use the appropriate Design and Make process terminology
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. use sketches and drawings to communicate ideas (free hand sketching, nets, isometric and oblique projections).
5. use colour and texture to enhance ideas.
6. present a working drawing with some details to enable the manufacture of a product.
7. know what is a system in terms of input – process – output.
8. use ICT to access, store and retrieve information.
9. make use of ICT to present information in graphical and text form.
10. present design ideas with the use of models 2D and/or 3D models/simulations where appropriate.
11. recognise and use the correct units and symbols.
12. produce flowcharts and work schedules

6.1.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. recognize hazards in the Design and Technology Laboratories.
2. understand and apply safe working practices.
3. use protective wear. (apron goggles)
4. consider safety when selecting materials and finishes.
5. make correct use of safety guards
6. store and use materials, components, tools and equipment safely.
7. make correct use of dust and fumes extractors where required.
8. know about the risks of hazardous vapours and other substances. (use of adhesives and finishes/solvents)
9. take the necessary precautions in the use and safe disposal of chemicals
10. read, understand and follow safety symbols.
11. dispose of disused products, materials and components in a safe and environmental friendly manner.
12. Know the procedures to follow in case of an accident.(burns, scalds and cuts).
6.2 RESISTANT MATERIALS

6.2.1 DESIGNING SKILLS

Students should be able to:

1. write a description of the situation.
2. analyse the situation.
3. write a Design Brief.
4. conduct research according to key words in the Design Brief.
5. investigate and evaluate a range of familiar products considering how they work, how they are used and the views of people who use them.
6. produce a specification that reflects the essential features of the Design Brief.
7. generate and record several ideas using text, ICT and graphic techniques.
8. present the chosen idea using appropriate communication, media, including graphical and ICT skills.
9. make a model, if necessary, using appropriate material.
10. develop a suitable work plan.

6.2.2 MAKING SKILLS

Students should be able to:

1. decide how and when to use appropriate materials by considering their purpose, tools and equipment available.
2. use tools equipment and processes to make, single (one off) and quantity products to ensure consistency and accuracy.
3. to join and combine materials and standard components accurately to achieve functional results.
4. use a range of equipment to make an appropriate choice of finish to reflect the aesthetic and environmental implication.
6.2.3 EVALUATING SKILLS

*Students should be able to:*

1. carry out appropriate tests before making
2. test and evaluate the product against specification using subjective and objective criteria.
3. suggest necessary modifications to the product.
4. evaluate in detail the design process.

6.2.4 KNOWLEDGE AND UNDERSTANDING

*Students should be able to:*

6.2.4a MATERIALS:

1. show awareness that materials have different properties
   - Physical: chemical, fusibility.
   - Mechanical: plasticity, ductility, malleability, toughness, strength.
2. know that the use of materials can have different effects on society.
   - Recyclability
3. know that different materials come in standard forms and sizes.
4. know the processes involved in manufacturing
   - One off.
   - Batch production.
   - Mass production.
5. know that different materials can be shaped and joined in a variety of ways.
   - Wasting: Machining (facing, parallel turning, centre drilling and grinding).
   - Deforming: press moulding.
   - Reforming: injection moulding, extrusion and casting.
   - Fabrication: brazing, welding, halving joints, knock down joints and pop-riveting.
6. know how to prepare for manufacture
   - Measure and mark: callipers (inside, outside, vernier, centre square and mitre)
7. know how to improve material properties by combining
   • Heat treatment: annealing, hardening and tempering.
   • Alloying of metal: brass, high speed steel, solder.
   • Manufactured boards: MDF, HDF, chipboard, plywood, blockboard, pineboards.
   • GRP.

8. know that appearance, durability, aftercare and quality can be achieved by different finishing processes.
   • Polishing.
   • Dip coating.
   • Laminating
   • Waxing

9. know how to achieve the best use of materials.
   • Matching the material to the manufacturing process.

10. understand the use of pre-manufactured standard components
   • Availability of various sizes.
   • Recognise the economic benefits of their use.

11. make use of ICT
   • Digital cameras

12. know about the use of computer integrated manufacture
   • Fast, accurate and repeatable production processes.
   • Recognise that computer systems can control machines and equipment.

13. know about the products’ effect on society
   • The moral and social impact of a product.
   • The importance of product reliability.

14. know the criteria how to analyse and evaluate products and processes
   • Analyse more than one resistant material.

**6.2.4b MECHANISMS**

1. know how to analyse and describe mechanisms in terms of input - process - output.
2. identify components by their physical appearance and symbols: wheel and axle, gears, cams, followers, levers belts, pulleys, and shafts.
3. know the practical application of levers: first, second and third class.
4. identify and use symbols to illustrate simple gear trains: driver, idler, driven.
5. know how to calculate simple gear ratio.
6. know about the use of plate cams: disc, pear and heart, snail.
7. know about the use of cam followers: knife, roller and flat.
8. know the importance of control in a production system.
9. identify and describe the following types of motion in mechanical systems:
   Linear, reciprocating, rotary, and oscillating.
10. know about the use of single acting cylinders in pneumatics: 2 cylinders in system.

6.2.5 COMMUNICATION

Students should be able to:

1. produce documentation with relevant and clear information, that is legible, and having the correct spelling, punctuation and grammar.
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tool, equipment and components.
4. use sketches, and drawings to communicate ideas (1st and 3rd angle orthographic projection).
5. make use of ICT, to present information in graphical and text form.
6. present a detailed working drawing to enable the manufacture of a product.
7. present a system in terms of input – process - output.
8. recognize and use the correct units of symbols.
9. produce flowcharts, time plans and work schedules.
6.2.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the design and make process.

Students should be able to:

1. know about safety in terms of function and product maintenance.
2. understand the need to consider risk assessment.
3. device a system of control when manufacturing to ensure health and safety.
4. know about the risks of hazardous vapours and other substances.
5. consider safety when selecting materials and applied finishes. (as bought finishes and their solvents).
6. know the procedure to follow in the case of an accident. (burns, scalds and cuts).
7. store and use materials, components, tools and equipment safely.
8. make correct use of dust and fume extractor where required.
At the end of their fourth Form, the students will be presented with a number of situations; at least two from each Area of Study. They choose one for their Extended Project and then, in their fifth Form the students must plan and execute a project that will demonstrate their knowledge and understanding of one or more of the four areas of study. The quality of work presented should reflect the student’s ability and skills. The Design Folio and Product produced from their Extended Project will be assessed and considered as their Core Paper for the SEC Examination. The Extended Project will only be assessed if the Design Folio is submitted. The students will also be given ample time for revising the four Areas of Study for which they have to sit at the SEC Examination.

TYPICAL SITUATIONS

1. Toys or Learning Activity Centres are always popular with young children. A manufacturer intends to produce a toy display item which has some type of action or moving parts built in.

2. Local Councils are promoting recycling of materials. Aluminium dinking cans take up plenty of space in the bringing-in sites and they are being emptied very frequently. The councils wish to minimize the collection costs.
7 ELECTRONICS

7.1 ELECTRONICS

7.1.1 DESIGNING SKILLS

_Students should be able to:_

1. analyse the situation to identify the need and problem. (with assistance)
2. write a Design Brief with minimum assistance.
3. research briefly the key words in the Design Brief.
4. research and analyse existing products.
5. write a specification with help mentioning some basic requirements
6. generate and record a number of ideas using text and graphic techniques.
7. select with reason and present the chosen idea
8. make simple modelling to check on the idea’s feasibility and use correctly modelling materials.
9. write with help a simple proposed work plan.

7.1.2 MAKING SKILLS

_Students should be able to:_

1. select appropriate materials from a given range and identify components visually.
2. work with combined material and improve on their basic skills to shaping them.
3. use tools and equipment to shape and form materials safely and accurately and finish them appropriately.
4. use finishing techniques to strengthen and improve appearance of their products using a range of equipment.
5. use ICT for simulation model. E.g. crocodile clips primary.
6. mount components on Vero board (soldering).
7.1.3 EVALUATING SKILLS

**Students should be able to:**

1. recognise that modifications during production are sometimes necessary.
2. test and evaluate the product against fitness for purpose and specification.
3. evaluate the design process

7.1.4 KNOWLEDGE AND UNDERSTANDING

**Students should be able to:**

7.1.4a ELECTRONIC COMPONENTS

1. Identify components by appearance.
2. Select the appropriate component/s to particular applications.

**Resistors**

- Know that resistors are used to control voltage and current in a circuit
- Know the main characteristics of fixed resistor.
- Make use of a resistor colour code to determine the value and tolerance of fixed resistors and select the nearest preferred value.
- Know the main characteristics of the following variable resistors: potentiometers, pre-sets, light dependent resistors and thermistors (temperature dependant component)

**Capacitors**

- Know that capacitors are electronic components that store electrical charge.
- Know the main characteristics that is common units and working voltage of polarized and non-polarized capacitors:- ceramic, tantalum, polyester and electrolytic.
- Know the precautions to be taken when using polarized and non polarized capacitors. (i.e. voltage rating, polarity).
- Know that capacitors can be used to provide some form of time control.
**Diodes**
- Know that diodes operate as a one way device.
- Know the procedure to identify the anode and cathode of a diode and light emitting diode.
- Know how to check a LED using the digital multimeter.
- Know how to connect a diode and light emitting diode in the correct polarity for operation.
- Know a typical application of a diode. e.g. use a diode as a one way device.

**Components as output devices.**
- Know the basic characteristics of the following components: reed and piezo type buzzers, lamps, fixed and flashing LEDs.

**Transistors**
- Identify the leads of a bipolar transistor that is PNP and NPN from diagrams and data sheet.
- Know how to use a transistor as a switching component
- Know how a change in the base to emitter voltage affects the flow of current in a transistor.
- Know how to choose transistor main parameters from data sheet: \( I_c(\text{max}) \), \( V_{ce}(\text{max}) \), gain (\( h_{fe} \)). No calculations.
- Be aware of the importance to regulate temperature in power transistors.
- Know and apply the use of the ‘Darlington Pair’ transistor.

**Power supplies**
- know the advantages and disadvantages of different sources of energy: (mains: power supply units: primary, (simple cells)), secondary and solar type (simple cells) including costs and applications.

**Mechanical and electrical switches**
- Know that a switch is a means of control to achieve functional results.
- Know that single pole double throw, double pole double throw, single pole single throw, micro, push (push to make that is normally open and push to break normally closed), toggle, reed, rotary, slide, rocker arm, latching (on and off) switches perform different functions.
- Know that switches are current rated.
- Know that relays are used as an interface between electrical circuits.
• Know that the relay coil is voltage rated and the contacts are current rated.
• Use relay as a latch.
• Use relay to provide a reverse polarity

7.1.4b CIRCUIT CONSTRUCTION

1. identify types of diagrams i.e.: block, circuit, component layout
2. classify materials by their properties (insulators, conductors and semiconductors).
3. describe current as a result of electron flow
4. use ohm’s Law for simple calculations
5. calculate the required resistance value in a potential divider circuit
6. use power formula for simple power calculations.
7. calculate the total resistance of two or more resistors connected in parallel.
8. calculate the required resistance value in a potential divider circuit.
9. use digital meter to measure voltage, current, resistance, capacitance, continuity, diode, and transistor current gain.
10. know the effect of connecting batteries in series and parallel (excluding internal resistance).
11. read electronic circuits / systems and identify the input – process - output sections.
12. follow/understand simple circuits to achieve a specified function.
13. use electronics simulation program to explore the effects of changing the values of components in a circuit.
14. use circuit simulation software to test systems and electronic circuits prior testing on breadboards.
15. build simple circuits using breadboard, veroboard and printed circuit.

7.1.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar. (with minimum assistance)
2. use the appropriate Design and Make Process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. use sketches and drawings to communicate ideas (free hand sketching, nets, isometric and oblique projections).
5. use colour and texture to enhance ideas.
6. present a working drawing with details to enable the manufacture of a product.
7. know what is a system in terms of input – process - output that is (open loop).
8. use ICT to access, store and retrieve information.
9. make use of ICT to present information in graphical and text form.
10. present design ideas with the use of models 2Dand /or /3D models where appropriate.
11. recognise and use the correct units and symbols.
12. know how to draw electrical/ electronic circuit and components layout.
13. produce flowcharts, and work scheduled.

7.1.6 Health and Safety

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. recognise hazards in Design and Technology laboratories.
2. understand and apply safe working practices.
3. use protective wear.(apron goggles)
4. consider safety when selecting materials and finishes.
5. make correct use of safety guards.
6. store and use materials, components, tools and equipment safely.
7. make correct use of dust and fume extractors where required.
8. know about the risks of hazardous vapours and other substances. (while soldering).
9. read, understand and follow safety symbols.
10. dispose of disused products, materials and components in a safe and environment friendly manner. (Batteries)
11. know about safety in terms of function and product maintenance.
12. know the procedure to follow in case of an accident.(cuts burns foreign bodies).
7.2 ELECTRONICS

7.2.1 DESIGNING SKILLS

Students should be able to:

1. write a description of the situation.
2. analyse the situation.
3. write a Design Brief.
4. conduct research according to key words in the Design Brief.
5. investigate and evaluate a range of familiar products considering how they work, how they are used and the views of people who use them.
6. produce a specification that reflects the essential features of the Design Brief.
7. generate and record several ideas using text, ICT and graphic techniques.
8. present the chosen idea using appropriate communication, media including graphical and ICT skills.
9. make a model, if necessary, using appropriate material.
10. develop a suitable work plan.

7.2.2 MAKING SKILLS

Students should be able to:

1. decide how and when to use appropriate materials by considering their purpose, tools and equipment available.
2. join and combine materials accurately to achieve functional results.
3. use tools, equipment and processes to make, single (one off) and quantity products to ensure consistency and accuracy.
4. join and combine materials and ready made components accurately to achieve functional results.
5. consider economic use of materials.
6. work with combined material and improve on their basic skills to shaping them.
7. cut, shape and form materials to specific tolerances.
8. use finishing techniques to strengthen and improve appearance of their products.
9. make an appropriate choice of finish to reflect the aesthetic and environmental application.
10. use ICT for simulation models. E.g. Crocodile clips secondary.
11. mount components on PC board (etching).

7.2.3 EVALUATING SKILLS

Students should be able to:

1. carry out appropriate tests before making.
2. test and evaluate the product against specification using subjective and objective criteria.
3. suggest necessary modifications to the product.
4. evaluate in details the design process.

7.2.4 KNOWLEDGE AND UNDERSTANDING

Students should be able to:

7.2.4a Electronic Components

1. Identify components by appearance.
2. Select the appropriate component/s to particular applications.

FET’s

- Identify the leads of an FET from diagrams and data sheet.
- Know how and when to use an FET.
- Use FETs in simple circuits.

Integrated Circuits.

- Know what is meant by dual-in-line package.
- Identify the I.C. pin numbers from diagrams and data sheet.
- Know the difference between Monostable and Astable.
- Use the 555 timer to build an Astable to produce output with both equal and unequal mark/space ratio at a range of frequencies.
- Use the 555 timer as a Monostable Circuit.
**Logic**

- know the function of the following gates: AND, OR, NOT, NAND, NOR, XOR.
- construct simple logic circuits using gates in combination to solve logic problems.

**Components as output devices.**

- Know the basic characteristics of the following components: bells, loudspeakers and low voltage D.C. motors

**7.2.4b CIRCUIT CONSTRUCTION**

1. use power formula for simple power calculations
2. identify types of diagrams i.e.: block, circuit, component layout, logic and flow charts.
3. know the difference between sinusoidal and square waveform.
4. state the relationship between Frequency and Periodical Time.
5. distinguish between Peak voltage and Peak To Peak voltage
6. use time constant formula for simple time delays.
7. use digital meter to measure voltage, current, resistance, capacitance, continuity, diode, and transistor current gain.
8. read electronic circuits / systems and identify the input – process - output sections.
9. follow/understand simple circuits to achieve a specified function.
10. use electronics simulation program to explore the effects of changing the values of components in a circuit.
11. use circuit simulation software to test systems and electronic circuits prior testing on breadboards.
12. build simple circuits using breadboard, veroboard and printed circuit board.
13. Design and make PCBs.
14. construct truth tables for the following gates: AND, OR, NOT, NAND, NOR, XOR.
15. solve simple logic problems using the logic functions in combination
7.2.5 COMMUNICATION

_Students should be able to:_

1. produce documentation with relevant and clear information that is legible, having the correct spelling, punctuation and grammar.
2. use the appropriate Design and Make Process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components
4. use sketches and drawings to communicate ideas (1st and 3rd angle orthographic projection).
5. make use ICT to present information in graphical and text form.
6. present a detailed working drawing to enable the manufacture of a product.
7. present graphically in terms of input – process – output, (closed loop) a system.
8. recognise and use the correct units and symbols.
9. produce flowcharts, time plans and work schedules
10. present design ideas with the use of models 2D/3D/ simulation where appropriate
11. know how to draw an electronic circuit and component layouts.

7.2.6 HEALTH AND SAFETY

_Awareness of health and safety should be shown throughout the Design and Make process._

_Students should be able to:_

1. know about safety in terms of function and product maintenance.
2. understand the need to consider risk assessment.
3. device a system of control when manufacturing to ensure health and safety.
4. know about the risks of hazardous vapours and other substances.
5. consider safety when selecting materials and applied finishes.
6. know the procedure to follow in case of an accident. (burns, foreign bodies and cuts)
7. store and use materials, components, tools and equipment safely.
8. make correct use of dust and fume extractors where required.
9. take the necessary precautions in the use and safe disposal of chemicals (etching solution).

10. understand the need for safe disposal of waste.

11. dispose of disused products, materials and components in a safe and environmental friendly way (batteries).

12. understand and apply safe working practices.
At the end of their fourth Form, the students will be presented with a number of situations; at least two from each Area of Study. They choose one for their Extended Project and then, in their fifth Form the students must plan and execute a project that will demonstrate their knowledge and understanding of one or more of the four areas of study. The quality of work presented should reflect the student’s ability and skills. The Design Folio and Product produced from their Extended Project will be assessed and considered as their Core Paper for the SEC Examination. The Extended Project will only be assessed if the Design Folio is submitted. The students will also be given ample time for revising the four Areas of Study for which they have to sit at the SEC Examination.

TYPICAL SITUATIONS

3. Through research it was found that small musical groups have a problem when playing music together. They sometimes start at slightly different times and find it difficult to keep together in the early stages of rehearsals. At present they try to combat this problem with the director counting or the drummer beating his sticks together; but this is not very accurate.

4. Chicken in a farm yard will all go back to the hen house on their own at dusk. Later, the farmer has to close the door to make his hens secure.
8 TEXTILES

8.1 TEXTILES

8.1.1 DESIGNING SKILLS

*Students should be able to:*

1. analyse the situation to identify the need and problem. (with assistance)
2. write a design brief with minimum assistance.
3. research briefly the key words in the Design Brief.
4. research and analyse existing products.
5. write a specification with help mentioning some basic requirements.
6. generate and record a number of ideas using text and graphic techniques.
7. select with reason and present the chosen idea.
8. make simple modelling to check on the idea’s feasibility and use correctly modelling materials.
9. write with help a simple proposed work plan.

8.1.2 MAKING SKILLS

*Students should be able to:*

1. select textile materials and components by their appropriate properties
2. use drafting tools to develop and produce a pattern.
3. layout a pattern correctly with the appropriate symbols marked in.
4. prepare materials for making up, allowing for waste and finish in an economical way considering fabric width, grain and one way fabrics.
5. use a range of tools and equipment to carry out a task or process effectively and safely:
   Cutting: Scissors, shears, craft knives.
   Joining: Domestic Sewing machine, overlock machine, needles, adhesives.
   Finishing: Irons (steam and dry), use of dyes/colour fast, fabric paint, fabric felt pens
6. select and use a range of accessories appropriate to the product:
   Fastenings, Decorative, Functional

7. apply assembling techniques appropriate to the product: Seams(temporary and permanent), Hems, Facings, Interfacings/Interlinings.

8. apply finishing techniques appropriate to the product: Ironing and Pressing.

8.1.3 EVALUATING SKILLS

_Students should be able to:_

1. recognise that modifications during production are sometimes necessary.
2. test and evaluate the product against fitness for purpose and specification.
3. evaluate the design process.

8.1.4 KNOWLEDGE AND UNDERSTANDING

_Students should be able to:_

**MATERIALS:**

1. classifying materials.
   - The origin and structure of natural and manufactured fibres. (cotton, linen, wool, silk, regenerated cellulose fibres, acrylics, polyamides, polyesters elastanes).
   - The conversion of fibres into yarn and fabric, processes. (spinning, weaving knitting, bonding, laminating).

2. identify the properties that materials need to have to fulfil the identified purpose for a particular situation.
   - Strength, durability, absorbency, elasticity, resilience.
   - The chemical processes applied to fabrics. (crease resistance, stain resistance, permanent pressing, shower or water proofing, flame proofing, moth proofing, strengthening).
   - Choosing the most suitable fabric for a process. (absorbing dyes and Paints).

3. understand the importance of fabric testing.
• Simple tests can be carried out on fabric for absorption, stretch, colour fastness, resistance to abrasion, flammability, stretch.

4. know that the use of materials can have different effects on society
• Safety standards.
• Pollution and waste management.

5. understand how products affect society.
• The importance of product reliability.
• Moral and social impact of a product.

6. understand the processes involved in manufacturing and how manufacturing companies are organised.
• Custom production (one-off)
• Batch production

7. identify the following textile components and their functions.
• Fasteners: buttons, hook and eye, zips, press fasteners (press studs), Velcro, toggles, laces and eyelets, clips/buckles,
• Structural components: threads, Vilene, interlinings, linings, shoulder pads, elastic bands, bias binding tape, webbing, bond-a-web, boning.

8. cut, join and shape various materials (fabrics and components) in a variety of ways.
• Pattern making: taking measurements, pattern drafting.
• Lay planning: V-fold, open lay, one way.
• Cutting out
• Joining fabric: Seams (Plain seam, overlocked seam, butt seam, French seam) adhesives, staples.
• Edge finishes: pinking, overlock/zig-zag, facings, binding, hems,
• Adding shape: darts, tucks, pleats, gathering.
• Pressing: the use of steam and vacuum, top pressing, under pressing.

9. select the finishing process for appearance, aftercare and quality.
• Dye: tie and dye.
• Fabric paints: brush, stencilling, block printing.
• Final pressing: use of steam and vacuum.

10. make use of ICT in single item.
• Computer software. (ex. Word)
• Clipart libraries.
• Scanner/Digital cameras.
• Printers.

11. know about the use of computer integrated manufacture.
• how ICT can be used in various stages of manufacture.

12. understand that a variety of assembly line systems are used in the production of textile products.
• systems of production

13. understand the care requirements of textile products including the standards to protect consumer.
• Care labels; the symbols used and their meaning.

8.1.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible, having the correct spelling, punctuation and grammar. (with minimum assistance)

2. use the appropriate Design and Make process terminology.

3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.

4. use sketches, drawings to communicate ideas (free hand sketching, nets, isometric and oblique projections).

5. use colour and texture to enhance ideas.

6. present a working drawing with some details to enable the manufacture of a product.

7. know what is a system in terms of input – process – output.

8. use ICT to access, store and retrieve information.

9. make use of ICT to present information in graphical and text format.

10. present design ideas with the use of 2D and/or 3D models/simulations where appropriate.

11. recognise and use the correct units and symbols.

12. produce flowcharts and work schedules.
8.1.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. recognise hazards in the Design and Technology laboratories.
2. understand and apply safe working practices.
3. use protective wear.
4. consider safety when selecting materials and finishes.
5. make correct use of safety guards.
6. store and use materials, components, tool and equipment safely.
7. make correct use of dust and fumes extractors where required.
8. know about the risks of hazardous vapours and other substances. (use of adhesives, dyeing substances and fixatives).
9. dispose of disused products, materials and components in a safe and environmental friendly manner.
10. read, understand and follow safety symbols.
11. take the necessary precautions in the use and safe disposal of chemicals.
12. know the procedures to follow in case of an accident: (burns, scalds and cut).
8.2 TEXTILES

8.2.1 DESIGNING SKILLS

Students should be able to:

1. write a description of the situation.
2. analyse the situation.
3. write a Design Brief.
4. conduct research according to key words in the Design Brief.
5. investigate and evaluate a range of familiar products considering how they work, how they are used and the views of people who use them.
6. produce a specification that reflects the essential features of the Design Brief.
7. generate and record several ideas using text, ICT and graphic techniques.
8. present the chosen idea using appropriate communication, media including graphical and ICT skills.
9. make a model, if necessary, using appropriate material.
10. develop a suitable work plan.

8.2.2 MAKING SKILLS

Students should be able to:

1. select textile materials and components by their appropriate properties.
2. use drafting tools to develop and produce a pattern.
3. layout a pattern correctly with the appropriate symbols marked in.
4. prepare materials for making up, allowing for waste and finish in an economical way considering fabric width, grain and one way fabrics, checked, striped, pattern lays.
5. use a range of tools and equipment to carry out a task or process effectively and safely:
   • Cutting: Scissors, shears, craft knives
   • Joining: Domestic Sewing machine, overlock machine, needles, adhesives, stapler.
   • Finishing: Irons (steam and dry), use of dyes/colour fast, fabric paint, fabric felt
6. select and use a range of accessories appropriate to the product:
   • Fastening, Decorative, Functional
7. apply assembling techniques appropriate to the product: Seams (temporary and permanent), Hems, Facings, Interfacings, Linings, Fullness, Gathering.
8. apply decorating techniques appropriate to the product: Quilting, Applique, Embroidery.
9. apply finishing techniques appropriate to the product: Ironing and Pressing.

**8.2.3 EVALUATING SKILLS**

_Students should be able to:_

1. carry out appropriate tests before making.
2. test and evaluate the food product against specification using subjective and objective criteria.
3. suggest necessary modifications to the product.
4. evaluate in details the design process.

**8.2.4 KNOWLEDGE AND UNDERSTANDING**

_Students should be able to:_

**MATERIALS**

1. classify materials
   • Fibres and yarns can be mixed and blended, and fabrics can be bonded to enhance both physical and aesthetic properties.
   • How the method of construction can affect the way the fabric reacts.
2. identify the properties that materials need to have to fulfil the identified purpose for a particular situation.
   • Insulation, flammability, reaction to heat, reaction to chemicals, enzymes and bacteria.
   • Physical processes such as, texturing, bulking, piling, permanent pressing.
3. know that the use of materials can have different effects on society
• The use of waste to create new fabrics.

4. understand how products affect society.
   • Environmental issues: pollution, waste management, economic use of material.
   • Recycling textiles materials

5. understand the processes involved in manufacturing and how manufacturing companies are organised.
   • Mass production

6. identify the following textile components and their functions.
   • Decorative components: embroidery and appliqué motifs, sequins, lace, braids, beads, fringes.

7. cut, join and shape various materials (fabrics and components) in a variety of ways.
   • Pattern making: pattern markings.
   • Lay planning.
   • Cutting out.
   • Joining fabric: Inserted seam, Lapped felled seam, Bound seam.
   • Edge finishes: waistband, collars and cuffs.
   • Adding shape: the use of interfacings.
   • Pressing.

8. select the finishing process for appearance, aftercare and quality.
   • Dye: tie and dye, tritik, batik.
   • Fabric paints: brush, airbrushes, stencilling, block printing, silk painting.
   • Appliqué’ and Embroidery: fabric, beads, sequins.
   • Dimensional fabric paints (image transfer).

9. know about the use of computer integrated manufacture.
   • How a designer in the textiles industry uses CAD.
   • How CAD/CAM to decorate the surface of fabrics (Direct Digital Printing).

10. know that mechanical or computerised equipment can be used on a production line system.
    • How CAM can help to speed up the production process in the: cutting room assembly line and pressing room.
• The need to process information database for systems to function.
• Stock control.

11. understand that a variety of assembly line systems are used in the production of textile products
• The use of a ticketing system to ensure correct assembly of product parts.
• The correct colour and weight match of components to satisfy production demands of a product.

12. know that a system may have costs involved in its operation, including labour cost, energy and overheads.

13. know the importance of Market Research involving:
• Use of statistics based on scientific principles.
• Testing and analysis the materials and components.

14. understand the standards that can be set during manufacture, to ensure quality control and methods to monitor them.

15. know the care requirements of textile products.

8.2.5 COMMUNICATION

Students should be able to:

1. produce documentation with relevant and clear information, that is legible, and having the correct spelling, punctuation and grammar.
2. use the appropriate Design and Make process terminology.
3. know and use the appropriate terminology for naming and describing materials, tools, equipment and components.
4. make use ICT, to present information in graphical and text form.
5. present a detailed working drawing to enable the manufacture of a product.
6. present graphically a system in terms of input – process - output.
7. recognise and use the correct units and symbols.
8. produce flowcharts, time plans and work schedules.
8.2.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the design and make process.

Students should be able to:

1. know about safety in terms of function and product maintenance.
2. understand the need to consider risk assessment.
3. devise a system of control when manufacturing to ensure health and safety.
4. consider safety when selecting materials and finishes.
5. know the procedure to follow in case of an accident. (burns, scalds and cuts).
6. store and use materials, components, tools and equipment safely.
7. take the necessary precautions in the use and safe disposal of chemicals.
At the end of their fourth Form, the students will be presented with a number of situations; at least two from each Area of Study. They choose one for their Extended Project and then, in their fifth Form the students must plan and execute a project that will demonstrate their knowledge and understanding of one or more of the four areas of study. The quality of work presented should reflect the student’s ability and skills. The Design Folio and Product produced from their Extended Project will be assessed and considered as their Core Paper for the SEC Examination. The Extended Project will only be assessed if the Design Folio is submitted. The students will also be given ample time for revising the four Areas of Study for which they have to sit at the SEC Examination.

TYPICAL SITUATIONS

3. Mountain biking is a popular activity for many young people today. Carrying food and protective/spare clothing for the day could make the biker uncomfortable and unstable. Investigate the possibilities for marketing a textile product solution.

4. A local school safety officer is working with a local textile manufacturer to produce a range of textile products that will serve the purpose of protecting children from traffic accidents. As a designer you have been asked to put forward your idea and to make up a prototype. You are to design for manufacturing in quantity.
9 FOOD

9.1 FOOD

9.1.1 DESIGNING SKILLS

*Students should be able to:*

1. analyse the situation to identify the need and problem. (with assistance)
2. write a Design Brief with minimum assistance.
3. research briefly the key words in the Design Brief.
4. research and analyse existing products.
5. write a specification with help mentioning some basic requirements.
6. generate and record a number of ideas using text and graphic techniques.
7. select with reason and present the chosen idea.
8. make simple working drawings to design physical appearance of the product.
9. write with help a simple proposed work plan (including the safety checks).

9.1.2 MAKING SKILLS

*Students should be able to:*

1. select ingredients and other foodstuff visually.
2. select suitable ingredients for pastry making, yoghurt, cheeselets and for the product.
3. measure and/or weigh ingredients correctly.
4. use (safely, hygienically, accurately and efficiently) measuring, cutting, chopping, shaping and mixing equipment and cooking / preserving equipment.
5. use appropriately processes and skills in the preparation of chosen food products.
6. utilize one or more of these cooking methods: boiling, poaching, grilling, steaming, dry/shallow/stir frying.
7. practice the basic skills of pastry making: sifting of dry ingredients, rubbing in fat, binding, kneading, resting and rolling out.
8. use appropriate utensils and equipment for specific ingredients.
9. use the appropriate processes and skills in the preparation of the food product.
10. follow the appropriate biotechnological process to make yoghurt and cheeselets (ġbejniet).
11. make the food product.

9.1.3 EVALUATING SKILLS

_Students should be able to:_

1. recognise that modifications during production are sometimes necessary.
2. test and evaluate the product against fitness for purpose and specification.
3. evaluate the Design Process.
4. evaluate the final product by designing and using Sensory Analysis Test.
   • simple Tasting Panels.
   • a basic Rating Test.

9.1.4 KNOWLEDGE AND UNDERSTANDING

_Students should be able to:_

9.1.4a MATERIALS

1. list and explain the dietary guidelines and the Food Guide Pyramid.
   • the World Health Organisation (WHO) Food Guide Pyramid.
   • the four basic dietary guidelines: eat less fat, eat less sugar, eat less salt, eat more fibre.
2. name and describe the five nutrients, their functions and sources in the body:
   • proteins: plant and animal (growth and repair).
   • carbohydrates: sugars, starches and fibre (energy).
   • fats: animal and plant (insulation, energy).
   • vitamins: A, D, E, K, B, C (general health e.g. eyes, bones, fight infections, protect from disease).
   • minerals: e.g. calcium, iron (general health e.g. eyes, bones, protect from disease).
3. identify basic food characteristics: appearance, taste, smell and texture.
   - appearance (e.g. colours, glossy, dull, shiny, pale, dark).
   - taste (e.g. spicy, salty, sweet, fatty, peppery, hot, chilli, fiery, tangy, bitter, herbal, cheesy, tasty, rancid, sour, stale, rotten, fresh).
   - smell (aroma)
   - texture (e.g. crisp, soggy, crusty, soft, tough, hard, lumpy, smooth, squasy, creamy, watery, buttery, light, rich, thick, thin, seedy).

4. name and use a wide range of equipment, appliances, processes and skills hygienically, effectively and safely to prepare food using the following basic skills:
   - measure/weigh,
   - cut,
   - chop,
   - shape (dice, cube, slice etc.),
   - peel,
   - shred, grate and form foodstuffs,
   - mix,
   - spread,
   - apply appropriate finishing (garnishing)
   - know the basic skills involved in making shortcrust pastry: weighing and measuring, sifting, rubbing in, binding, kneading, resting and rolling out.

5. working with and understand the properties of ingredients through:
   - Methods of Combining: sieving dry ingredients
     rubbing fat into flour: combining fat and starch
   - Methods of Binding: adding liquid
   - Shaping: rolling and folding pastry
     by hand pastry, filling
     moulds: equipment used (e.g. pastry tin / flan case / pie dish)
     casting: edible layer on outside of product e.g. pastry holding filling as in the case of lemon meringue pie, flans, cheesecakes.

6. identify the correct procedure to freeze and thaw pastry.
   - use appropriate packaging and labelling
• Quick Freeze function
• thawing using the microwave oven or standing in normal room temperature.
• freezing raw or cooked pastry

7. know the appropriate use of ovens to bake the pastry product, including; microwave, electrical and gas ovens, convection ovens (shelving positions) and fan ovens, temperature and timing.

8. know how to test and/or identify whether a food product is well baked.

9. know the correct and safe method for cooling.

10. identify and select the appropriate storage, serving and packaging of ingredients and food products considering hygiene, aesthetic and environmental factors.

11. list, describe and explain different food packaging and select suitable packaging, e.g. paper, cardboard, polystyrene for the food product, considering cost effectiveness, hygiene, aesthetic and environmental factors:
• select appropriate storage (refrigerator, freezer, room temperature) for different ingredients and food products.
• know why packaging is necessary
• list different types of packaging available, their advantages and disadvantages
• choose the packaging material appropriate to the properties of food to be packed (also considering hygiene and aesthetics)
• choose cost effective and environmentally friendly packaging

12. know the importance of quality in the design and make at all stages of the process.
• identify basic quality control points to ensure a high quality end product.

13. know how the food product could be produced in single, batch or mass production.

**9.1.4b BIOTECHNOLOGY**

1. define and describe biotechnology.

2. describe and conduct the application of a biotechnological process to produce the dairy product, yoghurt.

3. highlight that bacteria help to convert milk into yoghurt through a fermentation process.

4. know what is the function of the starter culture (in this case bacteria from purchased live yoghurt).
5. know and conduct the basic underlining biotechnological process in the making of cheeselets (ġbejniet).
   • know the different coagulating agents utilized for this process.
   • outline various additions that can be used to alter the flavour of this food product.
   • know that cheeselets (ġbejniet) are a healthy, low-fat, high-calcium traditional Maltese product
   • list equipment and ingredients required.

6. explain the importance of food safety and food lab hygiene throughout any biotechnological process.

9.1.5 COMMUNICATION

Students should be able to:

1. produce written communication with relevant and clear information that is legible, having correct spelling, punctuation and grammar (with minimum assistance).
2. use the appropriate Design and Make Process terminology.
3. know and use the appropriate terminology to name and describe the function of equipment, components (ingredients) and cooking skills.
4. use sketches and drawings to communicate ideas.
5. use colour and texture to enhance ideas.
6. present a working drawing to enable the manufacture of a product.
7. know what is a system in terms of input – process - output.
8. use ICT to access, store and retrieve information.
9. make use of ICT to present information in graphical and text form.
10. present design ideas with the use of 2D and/or 3D sketches, where appropriate.
11. recognise and use the correct units and symbols: metric measurements: g,kg,ml,l.
12. produce a work plan. (including safety checks).
9.1.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. recognise hazards in the food lab.
2. understand and apply safe working practices and regulations.
3. use protective wear: headgear, apron, ovengloves.
4. know and practise the safe and correct use and storage of equipment.
5. know and apply safe and hygienic practices when washing and caring for equipment and appliances.
6. understand the importance of safe and hygienic practices in the preparation, cooking, serving, storage, packaging and transportation of foodstuffs to include:
   - unsafe thawing and refreezing of food can result in food spoilage.
   - unhygienic refrigeration (e.g. uncovered food, blood dripping on other foods…) may result in cross contamination.
   - inadequate reheating of food may result in contamination.
   - cooking food to appropriate temperatures and for appropriate timing.
   - importance of personal hygiene.
7. identify basic causes of food contamination and their prevention.
8. know about food safety legislation for the food industry and consumer.
9. dispose of waste appropriately and in an environmentally friendly manner (separation of waste at source).
10. know the procedure to follow in case of an accident: (burns, scalds and cuts).
9.2 FOOD

FORM 4 (year 2)

9.2 FOOD

9.2.1 DESIGNING SKILLS

_Students should be able to:_

1. write a description of the situation.
2. analyse the situation.
3. write a Design Brief.
4. conduct research according to key words in the Design Brief.
5. investigate and evaluate a range of familiar products considering how they work, how they are used and the views of people who use them.
6. produce a specification that reflects the essential features of the Design Brief.
7. generate and record several ideas using text, ICT and graphic techniques.
8. present the chosen idea using appropriate communication, media including graphical and ICT skills.
9. develop a suitable work plan (including safety and quality checks).

9.2.2 MAKING SKILLS

_Students should be able to:_

1. select suitable ingredients and equipment.
2. use appropriate utensils and equipment, safely, hygienically, accurately and efficiently for different processes.
3. use appropriately processes and skills in the preparation of chosen food products.
4. make the food products using appropriate culinary processes and skills efficiently and effectively, utilising appropriate utensils and equipment.
5. practice the basic skills of making yeast dough: sifting of dry ingredients, mixing, binding, kneading, resting and rolling out.
6. follow the appropriate biotechnological process to make a yeast product.
9.2.3 EVALUATING SKILLS

Students should be able to:

1. test and evaluate the food product against specification using subjective and objective criteria.
   - evaluate whether materials and resources have been used efficiently, effectively and safely.
   - use criteria to analyse the quality of the product: flavour, colour, shape, volume, texture, health (calculating nutritional analysis of the food product), value for money, fitness for purpose, time management, aesthetics.
2. suggest necessary modifications to the product.
3. evaluate in detail the design process.
4. evaluate their final product by designing and using Sensory Analysis Testing.
   - Tasting Panels.
   - a Rating Test.
   - Star Diagrams.

9.2.4 KNOWLEDGE AND UNDERSTANDING

Students should be able to:

9.2.4a MATERIALS:

1. explain how all food is produced from ingredients, (components) in the food industry.
   - identify primary food, secondary food, tertiary food.
   - list the three different methods of processing (primary processing, secondary processing, tertiary processing), which allow the development from one group to the next group of foods.
2. describe simply how heat is transferred in the conventional and microwave oven i.e. by conduction, convection and radiation.
3. know the correct and safe use of the:
   - refrigerator: appropriate temperature, correct positioning of different ingredients in the refrigerator, efficient and effective use (e.g. keeping all food
covered, avoiding repeated opening and closing of door…)

• freezer: different types (chest, upright, fridge freezer), appropriate
temperature, freezing fresh food, blanching, defrosting food safely, frozen
foods (quality, nutrition, price), freezer symbols (star rating, fast freeze),
efficient and effective use (e.g. packaging and labelling, correct equipment…)

• cooker: different types (gas, electric), three main parts (hobs, grill, oven),
controls, safety (e.g. shut off gas detecting system i.e. gas supply automatically
ceases if flame is cut off, oven gloves…), symbols (Gas Marks / Celsius),
convection ovens (shelving positions) in comparison to fan ovens, efficient and
effective use (e.g. cooking times, batch baking, safe equipment for hobs, grill,
on…)

• microwave oven: principles behind microwave cookery, microwave radiation
(electromagnetic waves), important basic parts of the microwave oven, cooking,
reheating and defrosting, safety (e.g. Microwave Oven Safety Standard,
standing time…), advantages and disadvantages microwave ovens, efficient
and effective use (e.g. cooking times, suitable equipment…)

4. be aware of the factors that affect people’s choice of food: taste, price, time,
cooking skills, cooking equipment available, religion, culture/tradition,
environmental factors, special dietary needs and requirements, advertisements/ influence of other people.

5. be able to plan suitable meals for people of various age groups and who have
different dietary conditions. Planning suitable meals for: young children, pregnant
women, adolescents, elderly citizens, people suffering from coronary heart disease
(low saturated fat meals), people on a slimming diet, people suffering from high
blood pressure (low salt meals), people suffering from osteoporosis / osteomalacia
(high calcium meals), high fibre meals for people suffering from constipation and
related disorders, vegetarians.

6. identify the opportunities for recipe development and modification to produce new
products and products suitable for individuals with special dietary needs.

7. know and scientifically understand the relationship between the composition,
structure, characteristics and properties of food and the way in which it is prepared
and cooked using different cooking methods:

• moist methods of cooking: boiling, simmering, poaching, steaming, pressure
cookery, slow cookers, stewing and braising.
• dry methods of cooking: baking, roasting, grilling and barbecuing.
• frying: deep frying, shallow frying, dry frying and stir frying.
• microwave cooking.
• revise simple principles underlying heat transfer by conduction, convection and radiation.

8. understand the properties and working characteristics of food as a material and how different functional properties affect the finished products:
• thickening using thickeners (wheat flour, cornflour, potatoes, eggs).
• setting using setting agents (gelatine, cornflour, rennet e.g. cheeselets).
• fermentation (yeast).
• fortification with vitamins / minerals to enrich product (commercially).
• tenderising (marinating e.g. meat, and aging e.g. cheese).
• aeration: mechanical (e.g. beating, sieving, whisking, folding, rubbing-in),
• chemical using raising agents (baking powder, yeast, bicarbonate of soda),
• steam.
• coating (breadcrumbs, batters and sugar).
• glazing to add attractive finishes to products improving texture and appearance.
• binding: water and milk (e.g. for pastry, dough), eggs, flour and breadcrumbs.
• shortening (fat in baked goods to make them soft and crumble).

9. define and understand why food is preserved; name and briefly explain the methods used for preservation of food at an industrial and domestic level:
• dehydration: sun drying, spray drying, fluidised-bed drying, roller drying,
• accelerated freeze drying (AFD).
• heating: sterilisation, UHT, pasteurisation, canning and bottling.
• reduction of temperature: refrigeration, chilling, cook-chilling, freezing
• (domestic freezing, plate freezing, blast freezing, immersion freezing, cryogenic freezing).
• addition of chemical preservatives: additives (industrially), salt, acids (vinegar), sugar.
• irradiation.
• removal of air: vacuum packing, modified atmospheric packaging.
10. know how to test whether food product is ready.
11. list, explain and use current legislation with regard to food labelling.

12. know the correct method for planning, preparing, cooking, cooling and/or cooling and/or refrigerating and/or freezing, packaging, labelling, storing and if applicable transportation of the food product.
   select suitable packaging for food products considering hygiene, aesthetic and environmental factors (reducing, reusing, recycling, refilling).
   • know why packaging is necessary
   • list different types of packaging available, their advantages and disadvantages
   • choose the packaging material appropriate to the properties of food to be packed (also considering hygiene and aesthetics)
   • choose cost effective and environmentally friendly packaging
   • apply the correct labelling requirements according to local legislation.
13. devise strategies to make effective use of available time and resources:
   • analysing ideas against specification guidelines
   • list of ingredients (with quantities) and equipment / appliances
   • work plan
   • planning
   • time schedules
   • costing.
14. understand that quality control is a necessary part of production and marketing:
   • identify quality control points
   • review work at all quality production points
   • apply quality assurance techniques.
15. understand that safety control is a necessary part of production and marketing:
   • Hazard Analysis Critical Control Points (HACCP).
   • identify and analyse hazards and critical control points.
   • review work at all critical production points.
   • apply safety assurance techniques.
16. understand the relevance of function and aesthetics (ergonomic, sensory and functional consideration) of design ideas: i.e. taste, texture, appearance and aroma.
17. describe in basic terms the relationship between energy needs and food intake including lack and excess intake.

- Carbohydrates, fats and proteins provide energy which both the physical body and mind need to function properly.
- know the energy value of Proteins, Carbohydrates and fats and calculate the energy value of the product.
- different people require different energy needs depending on sex, age, lifestyle (active or sedentary), special requirements (e.g. pregnancy, athletes, elderly...)
- lack of food leads to lack of energy which may cause many physical and mental problems e.g. underweight and lack of concentration.
- excessive intake of energy-dense food leads to an excess of energy which may cause serious problems very common in the Maltese islands e.g. overweight and obesity.

**9.2.4b BIOTECHNOLOGY:**

1. know the basic underlining biotechnological process in the making of yeast cookery
2. know simple underlining processes of the fermentation process for the making of: bread and other yeast products.
3. make bread and yeast products hygienically using appropriate equipment.

**9.2.5 COMMUNICATION**

*Students should be able to:*

1. produce written communication with relevant and clear information that is legible, having correct spelling, punctuation and grammar (with minimum assistance).
2. use the appropriate Design and Make terminology.
3. know and use the appropriate terminology to name and describe the function of equipment, components (ingredients) and cooking skills.
4. present a working drawing to enable the making of a product.
5. make use of ICT to present information in graphical and text form.
6. draw a simple block diagram indicating input – process - output.
7. recognise and use the correct units and symbols eg. Freezer star rating, microwave symbol.
8. use graphical representation to present results.
9. produce a work plan including GANTT charts, quality and safety checks.

9.2.6 HEALTH AND SAFETY

Awareness of health and safety should be shown throughout the Design and Make process.

Students should be able to:

1. understand the importance of safe and hygienic practices in the preparation, cooking, serving, storage, packaging and transportation of foodstuffs.
2. recognise common safety symbols.
3. recognise causes of food contamination and know how to prevent them:
   • describe simply the process of food spoilage: explain the contamination of food through natural decay and through micro organisms.
   • name three main micro organisms causing food spoilage (bacteria, moulds, yeasts).
4. list the four conditions required for the growth of micro organisms (food, time, adequate temperature, moisture) and how changes in these conditions will affect the growth and reproduction rate of micro organisms.
5. describe how acids react with micro organisms.
6. describe how food poisoning occurs and ways of how to prevent it through safe and hygienic practices in food labs and following current legislations in this regard.
7. define the following terminology:
   • cross contamination.
   • danger zone.
   • high-risk foods
   • low-risk areas, high-risk areas.
• hazard analysis.
• critical control points.
• HACCP.

8. define and follow the different date marks of food items: use by, best before, display by, expires by.

9. applying health and safety principles throughout the entire process of food preparation, production, serving, cooling, storage, packaging and preservation according to 7 steps of HACCP:
   • Identify the hazards,
   • Identify the Critical Control Points (CCPs),
   • Establish preventive measures, ng production
   • Follow the Critical Control Points during production.
   • Correct problems if necessary,
   • Ensure safety checks are correct,
   • Keep records in work plan as safety checks.

10. choose and know about environmentally friendly products: minimum packaging, recycled packaging, ozone friendly, CFC free sprays, biodegradable products.

11. know the procedure to follow in case of an accident: burns and scalds, cuts.
At the end of their fourth Form, the students will be presented with a number of situations; at least two from each Area of Study. They choose one for their Extended Project and then, in their fifth Form the students must plan and execute a project that will demonstrate their knowledge and understanding of one or more of the four areas of study. The quality of work presented should reflect the student’s ability and skills. The Design Folio and Product produced from their Extended Project will be assessed and considered as their Core Paper for the SEC Examination. The Extended Project will only be assessed if the Design Folio is submitted. The students will also be given ample time for revising the four Areas of Study for which they have to sit at the SEC Examination.

**TYPICAL SITUATIONS**

1. A new airline catering company has recently been set up near Malta International Airport (MIA) to cater for different airlines. The meals must be suitable for the requirements of airline travel and also include varieties to cater for the special passenger needs i.e. vegetarians and Islamic travellers.

2. A local confectionery discovered that his sales are dropping and profits are decreasing. A main reason for this is that his sweets tend to be high in fats and sugars and a large percentage of his consumers are now more health conscious. The confectioner has decided to launch an innovative line of sweets.