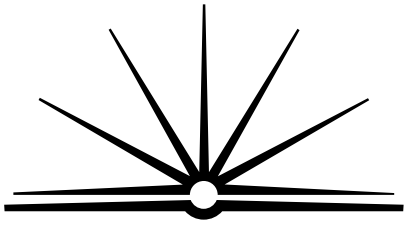

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EXAMINATION REPORT

Textiles and Design

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1998 Higher School Certificate Examination Report

Textiles and Design

In 1998, 719 candidates presented for the examination in Textiles and Design, of whom 193 sat for the 3 Unit paper, a decrease from the candidature of 1997. In the 2 Unit paper the pattern of question choice was the same as the previous year, with a majority of candidates choosing a second ‘design’ question as their fourth selection.

In Section I the most popular question was Question 4, relating to properties and performance, which was generally well done. The ‘dyeing and printing’ and ‘finishing’ questions attracted fewer candidates and those who attempted these questions did not give the depth and breadth required of a good answer.

In Section II the most popular question was on ‘culture’ – Question 5 (a). Very few candidates chose the question on the Australian Textiles Industry.

The two most popular questions in Section III were Questions 8 and 10.

In 3 Unit the most popular questions were on ‘colour’ – Question 2 (a), and on ‘Theatre Arts’ – Question 5 (a). Both questions were extremely well done.

The standard of the HSC examination scripts in 1998 was generally good, particularly in the Design section.

Marking Criteria

All questions for Textiles and Design are marked out of 20. In this report an indication of a good response is provided for each question. A brief summary of the best responses and the poorer responses follows each question.

2/3 UNIT

Section I – Science and Technology

Question 1 Dyeing and Printing

Excellent Responses covered the following points

(a) In this part of the question candidates identified and described in detail the most suitable dyeing and/or printing methods. These methods could have included fibre dyeing, stock dyeing, dope dyeing, cross dyeing, union dyeing, tie dyeing, pad dyeing (if carrier is used), foam dyeing, batik, transfer printing for the polyester/cotton red and white shirt, and fibre dyeing, stock dyeing, piece dyeing, pad dyeing or, to a lesser degree, printing methods such as roller, and screen printing for a blue worsted coat.

An example for polyester/cotton red and white shirt.

Candidates recognised the need to mention that the red and white colours had to be achieved for the finished article.

Method (i)

Yarn dyeing of the polyester yarns.

Dyeing involves the use of the dye molecule, which is made up of a chromophone (colour component) and the auxchrome (brilliance component) dissolved in a dye bath with the resulting dye being used to colour fibres or yarns.

The fabric is weighed to determine the amount of dye to be used, then it is wetted out.

The dye bath is prepared by adding boiling water to the dye powder.

Yarn on perforated cylinders is placed in a pressurized chamber, while heat is increased and maintained for an appropriate time.

All excess dye liquid must be cooled and rinsed out.

The three stages of dyeing take place, viz, migration of dye towards fibres, diffusion of dye into fibres and anchorage of the dye molecule within the fibre molecule.

The red dyed yarns can then be woven or knitted with the white bleached yarns.

Method (ii)

Transfer printing (the higher the percentage of polyester in the yarns, the more effective this would be.)

This method can be applied to the finished fabric, has no effluent, is relatively cheap and is suitable for intricate designs.

Dye is printed on to special printing paper.

Fabric, printing paper and printing blanket are moved around a heated roller through a heated container. As the heat and pressure are applied, the transfer print moves from the paper to the fabric. A red and white pattern can be applied to the fabric by any of the following dyes, which are suitable for the method chosen in part (a).

(b) Suitable dye/pigments for each colouration method

Dyes suitable for dyeing the cotton component of the fabric.

Direct dyes: Their elongated flat molecules become attached to the essentially flat cellulose polymer chains by means of Van der Waals forces and hydrogen.

Azoic: A two stage process – the fibre is impregnated with a 'coupling component' or naphthol then immersed in a bath containing a diazonium compound. The two components react within the fibre to form the dye.

Vat: Normally insoluble in water, these dyes can, however, be made temporarily water soluble to enable dyeing to take place, then converted back to their original form once inside the fibre.

Reactive dyes: The dye reacts chemically with the fibre to form a durable covalent bond.

Dyes suitable for dyeing polyester – a relatively difficult fibre to dye.

Disperse dyes: relatively insoluble in water, but microscopic particles may be suspended in water by the use of a detergent and stirring. The high crystallinity of polyester makes it difficult for the dye to penetrate, so a carrier can be used. The carrier, eg ortho-phenylphenol at a temperature of 100˚C, 'prises apart' the molecular chains, allowing the accessibility of the dye.

After dyeing the carrier can be removed.

Another method whereby the dye can penetrate the crystalline molecules is to dye the polyester under pressure – high pressure dyeing.

Disperse dyes can be printed onto the paper for transfer printing, but they must be those that vaporize easily when heated. When the paper is brought into close contact with hydrophobic fibres and heated, the dye molecules vaporize – they sublimate, and one by one penetrate the fabric.

Dyes suitable for dyeing blue worsted (wool).

Acid dyes – applied under acid conditions, usually sulphuric acid but, although inexpensive, have low wash fastness and only fair fastness to dry-cleaning. This does not make them suitable for a blue worsted coat.

Mordant dyes (chrome) – certain acid dyes may be made mordant after they have been applied to wool. This involves treatment with a chromium salt to form a metal complex in the fibre.

Premetalised dyes for wool – dyes resembling mordant dyes, except for the fact that the metal is formed before the dye is applied. These dyes, however, do not give a brilliant blue.

Reactive dyes – give ultimate wash fastness as the dye is chemically reacted with the fibre to form a durable covalent bond.

(c) Detailed descriptions of appropriate procedures highlighting the maintenance of colour fastness, particularly wash fastness and fastness to light.

Polyester red and white shirt – cool washing, mild detergent, dry in the shade, no soaking, avoid bleaching, avoid rubbing and a cool iron.

Blue worsted coat – preferably dry-clean (especially because of the type of garment) but, if washing, use warm water, hand wash, dry in the shade, avoid rubbing and steam iron on the wrong side.

Average Responses

(a) Appropriate colouration methods were suggested for each fibre. Clear diagrams were given to help in providing descriptions of methods.

Two fibres were used in the polyester/cotton red and white shirt, requiring different dyes for each fibre, and the garment required two colours – this fact was important to remember.

(b) The most appropriate dye/pigment for the colouration method was chosen and then detailed justification for the dye/pigment used was given.

(c) The maintenance of colour fastness related to care, including wash fastness and light fastness, was discussed.

Poor Responses

(a) Here candidates had difficulty in selecting an appropriate method of colouration for the item chosen; the method selected often had no affinity with the fibre content of that item. For the polyester/cotton most did not select methods that would result in a red and white garment. Poor descriptions were given.

(b) In these responses candidates were unable to state a dye stuff that would suit either the method or fibre given and could not relate this to the end-use.

(c) Washing procedure was generally stated but not described and there was no reference to colourfastness.

Many of these candidates gave information for testing fabrics, rather than referring to the need for caring for the item.

Question 2 Finishing

Example of an excellent response

Silk taffeta

(a) Evening dress skirt.

(b) Weighting – restores some of the weight lost when the process of degumming was utilised in the early processing. It creates the appearance of more volume for the final garment and greatly improves the drape, but reduces strength and abrasion resistance.

Moire – this gives a design feature of a watermark which is attractive for formal garments. This process is used mainly for aesthetic purposes.

(c) Weighting – the fibres are allowed to absorb tin salts (tin-phosphate-silicate). The silk is immersed in a solution, allowing the salts to permeate the yarns.

Moire – this is a finish procedure in which two layers of the fabric are passed together between heavy rollers, giving a non-durable watermark effect. The modern technique uses an engraved roller/calender bowl. The moire effect is achieved by a slight to and fro sideways displacement of the fabric as it passes through the nip of the calender.

Plain weave linen

(a) Table cloth.

(b) Beetling – gives a firm, flattened lustrous appearance. Helps give a soil-repellent finish suitable for this use.

(c) Beetling – the fabric is passed under tiny mallets which continually pound and flatten the yarns. The fabric becomes compact because the hammering flattens the yarns and closes the weave.

100% wool axminster

(a) Carpet.

(b) Moth-proof – because wool is a protein fibre, it is readily attacked by the larvae of the clothes moth and carpet beetles.

Mildew-proof – fungi (mildew) grow on hydrophilic fibres under warm, moist conditions. Fabrics will stain and eventually deteriorate.

(c) Moth-proof – Moth-proofing agents are Mitin, Eulan and the pyrethrins which kill the larvae of moths, but are not dangerous to people. The agents are applied during production.

Mildew-proof – to stop growth bacteriostats are applied, usually during dyeing.

Outdoor canvas

(a) Tents, tarpaulins, deck chairs.

(b) Water-repellent finishes.

(i) Shower-proofing – repels water and yet retains air permeability, so making the canvas suitable for tents, tarpaulins. Water does not penetrate but shower-proofing permits ventilation.

(ii) Water-proofing – makes the fabric suitably impervious to water and this makes it very suitable for deck chairs. Also helps to gain more resistance to spoilage.

(c) Shower-proofing – applying to the fabric a hydrophobic or water-repelling chemical, eg Scotchguard and Watershield.

Water-proofing – a coating of polymer emulsion which forms a film on curing. This thin film may be a wax or resin, mainly polyvinyl chloride (PVC).

Comments on reponses

Excellent Responses

(a) Choices of end-use showed an understanding of the nature and properties of the fabric named in the question.

(b) Candidates selected the most appropriate finishes for the fibre, yarn and fabric of the given end-use. These were specialized finishes rather than routine finishes that could be applied to many fabrics. These candidates were able to justify their choices by demonstrating the significance that the finish would give to improve the fabric performance for its selected end-use.

(c) A good description of the process involved in the application of the finish included naming and discussing specific chemicals and equipment, as well as an explanation of how the finish works and alters the original properties of the fabric.

Poor Responses

(a) Candidates were unable to identify appropriate end-uses for the fabric, showing little understanding of the list of fabrics given. Very few had any knowledge of axminster.

(b) These candidates failed to name a specific finish. Many confused finishes with fabric testing, while the finishes selected were generally not appropriate for the fabrics listed. Little justification for their choice was given.

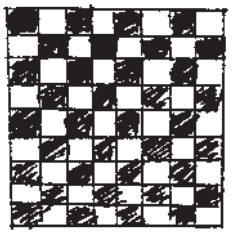
(c) Either the descriptions given had little reference to the finish named or the information given was inaccurate.

Question 3 Properties and Performance of Textiles

Example of an excellent response

(a) Describe structural differences

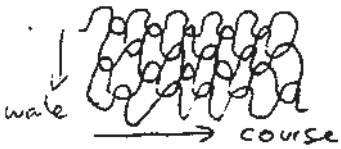
Plain weave



Each warp and each weft alternatively go over and under one another at right angles.

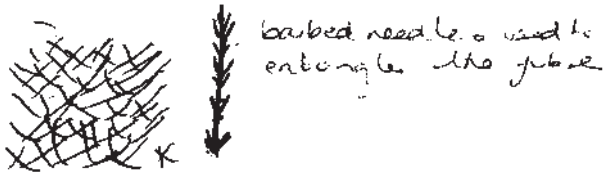
The result is warp and irregular appearance.

Weft Knitting



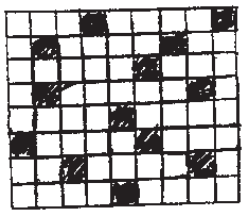
Interlooping of yarns in a horizontal direction. Each new row of loops is in the fabric. All the loops in one row are produced from one yarn unless special colour effects are required or circular knitted when one yarn follows the other.

Needle punched



Web of fibres that have been mechanically interlocked by passing through a needle loom of fast moving barbed needles to interlock the fibres to a stable firm backing fabric. The web is usually randomly laid – several layers – depending on desired thickness. Recycled fibres are often used.

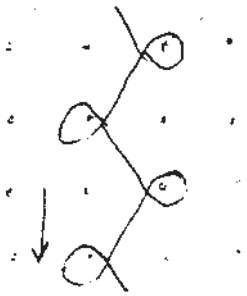
Satin Weave



Satins have more warp floats. Yarns passover at least 4 but preferably more weft yarns before passing under the next weft. There is never a twill point in showing weft yarns.

The result is that it floats.

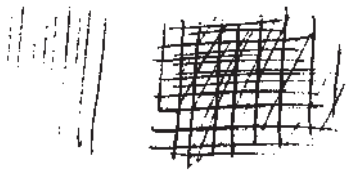
Warp Knitting



Closed loop-single bar warp knit.

From several hundred to over a thousand yarns are interlooped vertically, into their adjacent yarn to form the warp kit.

Melt bonded



Parallel or cross-laid or at random to each other. Largely composed of thermoplastic synthetic fibres which are heated, softened and melded into position in the fabric.

(b) End-uses

plain weave – business shirt

satin weave – evening dress

single jersey – T-shirt

warp knit – lace curtains

needle-punch – sound filters

melt-bonded – dish cloth (industrial wipes)

(c) (i) Plain weave business shirt: characteristically has a smooth crisp surface. Strong and stable weave adding to the abrasion resistance and durability of the shirt. Can be easily coloured or printed.

Satin evening dress: smooth lustrous surface due to the long floats of warp makes it ideal for an evening dress. Delicate structure, prone to surface abrasion due to warp floats. Excellent drape.

(c) (ii) Single jersey – T-shirt: weft yarn is extremely elastic and 'stretchy', with excellent recovery. Weft yarns can be fully fashioned to create garment shapes without seaming, by increasing or decreasing stitches as fullness requires (fully fashioning). With fine synthetic yarn the weft construction can be quite strong, creating sheer stockings. Knitting is faster than weaving to construct, which means cheaper, so that stockings are relatively cheap. The disadvantage of this method is the fact that when a loop is broken a ladder will form.

Warp knit curtains: This (Raschel knit) is a firmly constructed fabric with minimal stretch. The fabric is dimensionally stable with excellent drape and, therefore, ideal for curtains. They tend to be bulky, softer and heavier compared with the lighter tricot fabrics. Ideal for 'lace' and 'crochet' type designs.

(c) (iii) Needle-punched sound filters: this is a cheap method of fabric construction, as well as being resilient and hardwearing. Several layers can be added to give bulk if a greater degree of thickness is required.

Melt-bond non-woven industrial wipes – these do not fray, are very durable and abrasion-resistant which makes them ideal for disposable cloths. They, too, are very inexpensive to produce.

Comments on responses

Excellent Responses

In these responses most students displayed a sound knowledge of fabric structures and their properties.

Diagrams were clear, with precise explanation of the differences between the structures. Suitable end-uses were named and the properties of the fabric structures were related to the specific end-use named.

Poor Responses

Here, although most candidates understood plain weaves, many had difficulty with satin weave, both diagrammatically and descriptively, failing to mention the presence of floats and the irregular interrelationship which combine to create the smooth surface of satin weave.

These responses lacked diagrams of warp knit fabrics, could not describe the nature of weft knits and showed little knowledge of melt-bonded non-woven fabrics.

Candidates found it difficult to describe the differences between the fabric structures. Many failed to name end-uses suitable for the structure, merely listing the structure's properties.

Question 4 Properties and Performance of Textiles

Example of an excellent response

(a) Possible performance criteria – three to be selected.

Cot quilt cover –

ease of washing

absorbency

ability to breathe

comfortable against the skin

pleasing surface appeal

Sheet set –

ease of frequent washing

absorbency

smooth and comfortable against the skin

ability to withstand boiling or some form of sterilising

coolness in summer, warmth in winter.

Curtains –

resistant to sunlight damage

withstand home laundering

heavy weave of backed material so that sunlight is blocked and room

can be darkened for daytime sleeping

low flammability.

Floor rug –

ease of cleaning in cases of spills from powder/creams/nappy etc.

heavy weight to assist in insulation against noise

resist movement on floor

provide warmth underfoot during winter.

Mosquito net –

strength to prevent tearing and sagging

ability to see through, but with holes small enough to prevent insects entering

heavy enough to stay draped over cot

ease of washing.

Mattress protector –

prevent passage of liquids – moisture-resistant

comfortable to lie on

thin, non-bulky

easy to wash frequently

(b) Suitable fibre, yarn and fabric and justification.

Cot quilt cover – mercerized cotton fibre, combed yarn, plain weave fabric such as chintz, poplin.

Cotton fibres are absorbent and withstand frequent washing. Combed yarns give a smooth appearance and feel soft against the skin. Chintz and poplin have an aesthetic appearance allowing plain colours and/or printed designs. Plain weaves allow for movement of air through fabric.

Sheet set – Cotton/polyester blend fibre content, combed yarn, plain weave fabric such as percale for summer or flannelette for winter.

Cotton fibres facilitate absorbency, comfort against the skin, withstand washing in hot water and can be sterilized. Blending with polyester will increase the washing ability and will require less ironing than pure cotton, as well as increasing the durability.

Combed yarns feel comfortable against the skin as well as increasing the durability of the article/garment.

Percale plain weave for comfort, appearance and cool to touch for summer.

Flannelette with its napped surface provides added warmth for winter.

Curtains – Cotton/polyester blend of fibres, combed yarns or a slub yarn, shantung or heavy chintz fabric with rubberized lining.

Cotton fibres allow for ease of laundering and are easily dyed or printed.

Polyester fibres will provide insulation against heat, durability and prevent yellowing with resistance against sunlight.

Slub yarn or heavy weight fabric will provide density allowing the curtain to hang well and darken the room. Plain woven fabrics allow for easy printing of bright coloured designs suitable for a child’s nursery.

Floor rug – Wool fibres, woollen combed yarn and tufted carpet structure. The wool fibre does not trap dirt and will provide the warmth and insulation required of a floor rug. The yarn structure provides a strong yarn to prevent wear. The tufted structure that is dense will be heavy and the backing fabric will prevent slippage.

Mosquito net – Nylon fibre, textured filament yarns, raschel knitted structure. Nylon fibres provide strength and durability, are easily laundered and will not become yellow. Textured yarns add to the strength, but are soft enough to drape well. The knit structure provides enough openness for transparency but still gives protection from insects.

Mattress protector – Cotton fibre, carded medium twist yarn, loop pile fabric with nylon plastic backing attached to underside.

Cotton loop pile provides the required comfort and absorbency and is washable. The nylon provides the waterproofing necessary for this item, and is also easily laundered.

Comments on responses

Excellent Responses

Here candidates answered all parts of the question, giving criteria for the three selected items. They were able to give appropriate fibre, yarn and fabric choices for each item, including giving the correct name to the fabric. Justification of choice was well done.

Poor Responses

Here candidates were unable to identify performance criteria for the items chosen, often using the same criteria for all three items. They were generally able to name a fibre, but could not state any fabric names or yarn structure and referred to fabrics using fibre types, eg gave 100% as a fabric. They confused yarn structures, referring to multifilament staple, cotton synthetic yarn, twill weave.

There was little, if any, justification for the choice of fibres.

Section II – Textiles and Society

Question 5 Culture and Textiles

Question 5 (a)

Example of an excellent response

Expressions of a people's belief:

Attitudes to modesty – Japanese generally are not offended by nudity, Sumo wrestlers wear a minimum of clothing.

Status of women in Japan is confined mainly to home and to practising traditional crafts. The traditional kimono is time-consuming to assume and requires dignified movement in wearing.

Religion – examples of clothing worn for religious ceremonies. The origin of embroidery in India is ritualistic and produced as a gift to divine powers. Buddhists believe in unselfishness, this being represented by the garment's silhouette being constructed with little waste of fabric.

Colours in many cultures represent many things. Red in embroideries are believed to ward off evil spirits, while silver is added to attract good spirits and to ward off evil spirits in the clothes of the Hilltribes of Thailand. Black signifies death in many Western cultures.

Expressions of a people's environment:

Typography – local landscapes are embroidered into many Japanese kimonos.

Resources available – many cultures, especially in their national and traditional clothing, use the fibres that are produced in that area. Wool from Peru is used in the felt hats and ponchos worn by Peruvians; the vegetable dyes from the roots and barks of the local areas are used to dye the clothing and household textile items of Indonesian peoples.

Animals and the surrounding environment are often depicted in clothing: the Aztecs use feathers from birds to decorate clothes and headdresses.

Many designs in the clothing of people are direct adaptations from a native flower, plant or animal, eg the lotus flower of Japan, the embellishments of the carpets of the Middle East cultures.

Climate requires a particular type of dress, from the fur and skins of the Innut people through to the people of the deserts in Northern Africa who wear long, loose-fitting clothes made of wool to protect them from the intense heat.

Record of the history of a culture:

The development of the traditional dress of a culture – the telling of a culture's history through embroideries, wall hangings, eg the Bayeaux tapestry. The migration south from Burma and China, plus the influence of the occupation by France and Holland on the diversity of dress in Thailand.

The art of the culture is carried from the architecture through the artefacts of that culture to the dress and decoration that is worn by the people, as in India with the embroidery on saris with typically stylized rows of designs of motifs found in the architectural decoration of the same period.

Many people following the semi-nomadic lifestyle wanted to express creativity. This led to a need for a portable artwork, hence the ornamentation of their clothing. Many of these techniques are still practised today.

The textiles used in many festivals, both religious and non-religious, are designed to express the history of a specific culture.

The mode of living dictates the preferred types of clothing, eg city business workers in China have a definite preference for Western style suits, whereas the farmers dress in more traditional outfits.

Record of a culture's technical development:

Modern methods of producing clothes that copy the traditional hand methods, eg the Ikat weaving produced by machinery now used in Japan, although the traditional method is still valued and practised.

The use of synthetic dyes and modern printing methods to produce batik cloths and clothes for tourists in Indonesia.

The traditional practice on a Cuna Indian girl's coming of age when she has made a mola by the traditional technique of reverse quilting is still practised, but the theme may be a television advertising campaign, smoking, or spaceships.

The effects of Western cultures on tribal textiles. One American Indian Tribe who adapted their technology and design ideas, to meet the changing needs of Western people, has survived. In India, however, the Kashmiri people who produced the hand-woven Paisley shawl were unable to change and when the weavers in Europe flooded their market with loom-woven shawls, this virtually wiped out the Kashmiri people's efforts.

Comments on responses

Excellent Responses

Candidates fully understood the question being asked, particularly the phrase 'textile art forms'. They discussed all four areas, illustrating each point with a clear example of a culture, and giving an appropriate example of a culture to illustrate the point they were making, demonstrating an extensive knowledge of several cultures.

Poor Responses

Most candidates had little knowledge of the first three areas of the question and very few mentioned technological development. There was either very little reference to any cultural example or only one culture was referred to.

In some cases candidates wrote all they knew about a culture studied and made little reference to the question that was to be answered.

Question 5 (b)

Example of an excellent response

Traditional culture: Irish culture

Contemporary culture: Australia

(i) Sketches were drawn of an Irish tapestry, using a traditional motif, and an Australian hand-knitted jumper showing an Australian scene with a Koala design.

(ii) Irish Culture

Resources available for use in the Irish tapestry include the use of wool from sheep, hand spun to create the coarse yarn necessary for tapestry wool.

Originally, local lichen, moss, clay, stones, flowers and foods were crushed with a mortar and pestle to create the dyes for the woollen fibres. They created a range of earthy colours – greens, browns, creams, purple and terracotta.

The tapestry canvas was made of locally grown flax woven on hand looms by one family group, and was meant for both personal needs and trading.

Needles were made of bone or, if meant for trading, roughly made metal.

Technological developments have greatly influenced the creation of similar products today. Production of other textiles consisting of cotton fibre mixed with synthetics and imports have increased the variety of tapestry canvas in use.

Improvement through technological developments have increased both the gain of fibre per harvest and its quality, thus lowering prices and allowing access to all.

Synthetic colours and dye application to wool fibres for tapestry have increased the quality of the wool, variety in colour and performance characteristics. Moreover, developments have improved performance qualities of the wool itself so that its serviceability and accessibility have been increased and costs lowered.

The creation of tapestry needles has created a tool that is easy to use, strong and relatively cheap, making stitching easier.

Social significance and means of self-expression and communication:

- tapestry work has great significance socially as well as practically
- it was used for covering, providing warmth in cold weather and was used for wrapping
- hung on walls to keep out moisture
- handed down to the next generation
- given as token of goodwill, expressed in the symbols used in the work
- reflected spiritual ideologies.

The swastika symbolised the sun, which was important to their crops and lives in general. The swirls moving in opposite direction represented the meeting of earthly bodies and spiritual dimensions.

The use of symbols of swirls and lines indicate a few ways in which the Celts made connection with their environment, their religion and life's mysteries, as well as their concern for life after death. Other motifs included animals – birds, hounds – plants and knots.

Tapestry and the creation of textiles became a way of expressing their lives and beliefs.

Inspiration for the motifs came from their environment and The Book of Kells, lettering forms and older symbols carved in stone in their environment.

Today the symbolic meanings often remain and are frequently abstracted to be utilised with other media in new applications. Tapestry remains a strong traditional craft reflecting past history, cultural heritage and ideological meanings.

(ii) Contemporary Australia

Resources available and technological developments.

One of Australia's major products for this market is wool. For the knitter the resources available enable a great variety of designs to be created.

Cheap and easy access is available to an excellent range of knitting wools. Other fibres such as synthetics, silks, cottons and novelty yarns increase design possibilities for knitters. This extensive range of yarns offers a great variety of colours due to use of synthetic and improved natural dyes, both in performance and range of colour.

Availability of yarns is through an extensive distribution system – shops, fairs, catalogues, department stores. Information and training for making such yarns in the home is available for woollen fibres.

The quantity of wool available, as well as its quality, contribute to the excellent range of such yarns.

Tools to use – a range of knitting needles in a variety of sizes, manufactured in metal as well as specialised needles for special techniques.

Flat bed knitting machines are available for home use for the knitter, providing a range of tools and design capability.

Social significance and means of self-expression and communication.

Knitting enjoys a healthy acceptance both as a craft and a medium for expressing design for personal, commercial and cultural meaning.

Garments are made for self and for gifts. In a modern age the gift of something handmade is highly appreciated.

Knitting is viewed as a leisure activity, although the return of the handknitted garment into the marketplace appeals to a niche market but is appreciated for effort by all.

Symbols and motifs are drawn from many sources, eg cultural heritage, modern, abstract designs, while computerised transfers of pictures and drawings into handknitted patterns can be done commercially or by using software on the home PC.

Jenny Kee is particularly noted for using handknitting to express her love of the Australian environment, for commercial promotion.

Traditional knitting is done for warmth in winter – lighter yarns have enabled handknitting to make a great impact in providing clothing and items for warmer months.

(iii) Status of the textile 'worker' in each of the selected cultures.

Traditionally, in Ireland, the textile worker had an important function in contributing to the trade of goods to provide resources, as well as for supplementing farming endeavours. Women traditionally carried out the work on textiles in the home, with tapestries being created more for personal reasons and value than trade. In wealthier circles ladies and those in service orders, such as ladies in waiting and nuns, developed tapestry as an art form.

In Australia, the textile worker is protected by a range of international, national and industry-focused laws regarding hours of work and occupational safety and health. Although knitting remains a practical craft and is performed mainly by women in the home, its forms straddle all levels of society where the craft is performed. Today knitting at home is not held in as high regard as that of the tapestry worker.

Average Responses

(i) Candidates showed a good understanding of a traditional and contemporary culture.

Sketches were drawn clearly and very well labelled, the information giving a clear understanding of the items chosen.

(ii) Candidates gave several relevant examples of resources available to each culture and successfully discussed technological developments in reference to the items they had given. Social significance and means of self-expression and communication were well explained and related to the item chosen.

(iii) Candidates were able to compare the status of the textile worker from both chosen cultures and to show the similarities and differences of each.

Poor Responses

In these responses candidates generally found it difficult to identify a contemporary culture.

(i) Items drawn were incorrect, while labelling was inappropriate. Many discussed more than one item, rather than focusing on one item from each culture, and discussing it in detail.

(ii) Statements were generalized, giving no specific examples.

(iii) No understanding was shown of the phrase 'status of the textile worker' and no comparison was made between the positions of the workers in each culture.

Question 6 History of the Textile Industry

Question 6 (a)

Excellent Responses

Points that could be raised relating to fibre, yarns, fabrics and garments.

Fibres

(i) Variety of textile products.

At the beginning of the Industrial Revolution natural fibres were the only ones available, although attempts had been made to create synthetic fibres. For example, in 1664 Robert Hooke had tried to imitate silk fibre; in 1840 an apparatus was invented that drew synthetic filaments through small holes, while in 1884 Count Hilaire de Chardonnet produced the first synthetic textile fibres from nitrocellulose.

Man-made filaments were officially recognized in 1925.

As the 20th century has progressed, development has raced ahead. Regenerated fibre technology has made way for synthetic production till, today, fibres can be produced to meet a very wide variety of needs.

Other technologies such as those producing fibres with specific properties or special effects, eg Nomex and microfibre fibres, and the blending of fibres have also given rise to a greater variety of products.

(ii) Availability of textile products.

Fibres have always been a major part of human life.

As the Industrial Revolution changed lifestyles, so the availability of fibres changed. The more sophisticated the technology, the more fibres were produced and the uses of fibre became wider. Automation, speed of production, computerisation have made fibres more available. Clothing in earlier times was very limited, unless people were very wealthy, but today, most people have a wide range of clothing. Artificial fibres have also become much more widely used.

(iii) Quality of textile products.

Fibres in the early stages of industrialisation were of varied quality. The techniques of production were relatively simple and there was no way of achieving a standard overall production. This, however, has changed. Quality is now more consistent and can be more easily controlled. There has been a need to introduce consumer laws to prevent poorly produced fibres from being marketed, but this is not a result of the failure of technology.

Yarns

(i) Variety of textiles.

As with fibres, technology has increased the variety of yarns. The early inventions spun only a simple yarn but at a much greater speed than hand-spinning. Throughout history the types of yarn have increased, firstly the novelty class of yarn, eg the slub yarns etc, through to the texturizing of yarns to improve the properties of synthetic yarns, to the blending of yarns to improve and vary properties of fabrics using these yarns, and the hi-tech yarn of microfibre, stretch yarn etc.

(ii) Availability of textile products.

The increased variety, speed and quantity of the technology in yarn production has made textiles available to all people, not just those in the high socio-economic group. Yarn production is very efficient, there is less waste and the end-use can be engineered with the type of technology now available.

(iii) Quality of textile products.

In the very early stages of technology advancement, the quality of yarns produced was not as good as those produced by the hand method. Yarns were uneven and coarse, but, as inventions improved, so did the quality.

Today, with improved technology and machinery, the computerisation of the process and the process of using the yarn can result in an almost unlimited number of end-uses.

Average Responses

Here candidates discussed the relevance of textile technological developments to variety, availability and quality.

They related developments from the Industrial Revolution to recent developments, especially in relation to:

- variety – blended fibres, textured yarns, different fabrics such as elastameric, microfibre.
- availability – production faster, more efficient, automation
- quality – consisitency in blends, improved properties, ability to detect faults.

Poor Responses

These lacked knowledge of technological processes and the history of production. They failed to discuss variety, availability or quality in relation to the question, and the concept of the relationship from past to present was often ignored.

Question 6 (b)

Excellent Responses

The textile industry remained a cottage industry until the mid-18th century, with domestic co-operative operations. Workers were independent and self-sufficient, with most work being done by hand, on spinning wheels and hand looms, and with the use of natural dyes in home coppers.

Factory organisation became more advanced between 1760 and 1815 at the peak of the Industrial Revolution. Many inventions led to industrialisation and factories brought hardship for workers and impersonal relationships with employers.

Technological development was very rapid, with such inventions as the Spinning Jenny, water frame, Spinning Mule, cotton gin, ring spinning, flying shuttle etc.

Factories were set up in cities. Workers moved from the country to crowded and unsanitary conditions in the city. Piecework (contracted) was sewn at home and taken back to the factories.

Working conditions were harsh. The factories were dirty and polluted, crowded with machinery, dark, poorly ventilated, noisy, with workers being expected to work very long hours (between 12 and 17 hours a day) and to perform monotonous tasks. Illness and inability to work was common and lost jobs resulted.

Child labour was common as children were cheap to employ and could be used to clean and repair machinery in small places where adults were unable to fit. Injuries prevailed due to exposed machinery parts and decreased alertness of workers because of fatigue.

By the 20th century technology had advanced – flying gripper, water-jet loom, air-jet loom, shuttles, weaving, carpet tufting, computerization – and, by 1979, workers in the USA were expected to work for 35 hours a week. In Australia employees work for 38 hours per week.

When factory reform did come, it became compulsory for children to attend a school for a certain time and children under 9 years of age were not allowed to work. Safety laws were enforced, eg machinery parts covered by guards.

Sweat-shops were common, with workers in the apparel industry forming unions to fight for better pay and working conditions. By the beginning of the 20th century working conditions in the Western world improved. No children worked legally in factories, although factories and working environments had improved greatly.

In the late 20th century both working environment and conditions have improved greatly – award wages have been granted. Well-engineered factories have been established, with better living and working conditions for employees. Fringe benefits have been given and workers relieved of monotonous tasks. Sick leave, protective clothing, superannuation, and compensation have been awarded.

Occupational Health and Safety Regulations are law in all Australian States.

With new technology, new conditions have created unemployment due to the replacement of workers by machinery. Unskilled workers are most at risk. Skilled labour (eg engineers, chemists) are in high demand, with new jobs being created due to new advances in technology.

Average Responses

Candidates' responses traced the developments in textile technology up to the present day.

Good examples were given where appropriate and the relationship between technology, change in working conditions and employment of textile workers was examined throughout the changing history of the industry.

Poor Responses

In these responses candidates failed to understand the requirements of the question and ignored parts of what was being asked. Many gave few examples and did not discuss the concept of past and present, or how developments in textile technology related to the:

technology

changes in working conditions

employment of the textile worker.

Question 7 The Australian Textile Industry

Question 7 (a)

Excellent Responses

Social:

Fashion and marketing trends, especially in teenage and women's fashions, encouraging consumers to buy overseas labels and designs, eg Nike.

Employment – fewer employment opportunities are on offer due to lack of skills and status – female NESB piece workers are often poorly paid.

Political:

The failure of the Button Plan with the reduction of tariffs, bounties and quotas has brought a flood of imports.

The regional location of many large plants puts pressure on the Government to help the industry to modernise.

Balance of payment due to the commodity nature of exports results in value-added products.

Greater Government vision is needed.

Technological:

Initial buying of machinery adds to the cost of production, even though production, as a result, may be faster. In some areas of production Australia's population cannot support the capital expense and running costs, eg Glo-weave shirt manufacture acquired a fully automatic collar machine for business shirts, but had the market to run the machine only 3-4 days a week, which was uneconomic and the factory closed.

The textile industry is becoming more capital expensive which, in turn, requires fewer workers, thus affecting the social and economic aspects of the industry.

Economic:

Negative balance of payments.

There has been a concentration of industrial plants in the country, but many of these have had to close or reduce staff, thus causing a problem in employment.

Australia has not had the value-adding in the fibre industry that many other industries have had, eg raw wool is sent overseas and the buy-back product is very expensive.

There is a lack of synthetic fibres produced in Australia, which has the highest consumption of these fibres.

The high cost of labour in Australia compared to the mostly lower wages overseas means Australians can buy imported products much more cheaply than those that are manufactured at home. One answer that some Australian companies have is to move factories offshore, which is a loss in economic terms to the country.

Average Responses

Here the following four areas were discussed with examples that related to the statement given:

Social – discussed issues of workers and the influence of the market and fashion on consumers, including their desire for overseas goods.

Political – gave information on government policy, eg tariffs, quotas. Discussion of the effect of the low Australian dollar.

Technology – type of technology, high costs of installation offset by production rate.

Economic – lower wages overseas, use of offshore facilities.

Poor Responses

These answers had little relation to the question or repeated the same information for each reference area. Most did mention working conditions and low wages, making some reference to the Button Plan.

Question 7 (b)

Example of an excellent response

Fibre production

The manufacture of wool and cotton affect the environment. Cotton, a deep-rooted plant, requires high amounts of fertilizer which wash into the natural waterways; there is a need to control weeds and insects so heavy spraying results, and, at harvest time, there is a serious problem with fibre littering the highways. All crops require much water to grow so, in Australia, irrigation is used. Soil erosion can result, and salinity of soils is a problem.

A much more environmentally sound crop to grow is hemp, but this crop is illegal to grow in Australia, except with special permission.

Wool: soil erosion can occur if high numbers of sheep are maintained in dry areas. They are sprayed, and this, along with dipping solutions, can escape into the environment.

Yarn production

In all production a higher quantity of energy is used, often with the burning of fossil fuels contributing to the depletion of the ozone layer and global warming. Some production processes require high quantities of water, eg wool scouring, which results in excess water usage and the problem of sludge.

Fabric production

Again high usage of energy and of quantities of water affect the environment.

Colour and Finishing

Considerable use of energy for heating dye baths. The effluent problem, when dye bath is released, can lead to water pollution. Chemicals used in both dyeing and finishing can be toxic and hard to dispose of.

Garment manufacture

Fossil fuels for machinery are used for extended periods. High problems arise with discarded fabric and remnants usually resulting from landfill. Landfill areas are running out in many areas of Australia. There is an unsuitable and wasteful use of packaging. Transport costs are high, and exhaust from transport trucks toxic. There is noise pollution from machinery for factory workers.

Recycling of clothing and fabrics

There is more demand for disposable items – eg chux, nappies and in the medical industry; many of these are not biodegradable so that landfill is again a problem.

Many off-cuts and items of old clothing are being recycled instead of being dumped, but there is still a long way to go.

Average Responses

This question attracted very few candidates, most of whom provided a general introduction on the impact of textile production on the environment and then detailed points for each area, relating to their impact on the Australian environment.

Poor Responses

Candidates repeated the terminology presented in the question and could provide only one or two points, with little discussion. Some confused ‘environment’ with ‘weather’ and often discussed the properties of fibres.

Section III – Design

Question 8

Example of an excellent reponse

(a) Cricket

Design Criteria

Meet formal requirements, eg collar, tie, jacket, long-sleeved shirt.

To reflect Australia, eg green and gold colours.

Identify sporting team, eg motif/emblem.

Easy care, eg fibre blends to reduce wrinkles.

Comfortable to wear, eg loose fit, top under jacket to wear if hot.

(b) Sketch

Front and back view.

Formal design.

Colours labelled.

All major construction lines.

Logo/motif.

Labelled formal features, eg shirt collar/lapels, blazer, cuffs, pleats.

(c) (i) Polyester/cotton plain weave shirting – comfortable to wear, wrinkle resistant, durable.

(c) (ii) Wool gaberdine jacket, trousers – warm to wear, formal qualities.

(d) (i) Wrinkle resistant. Fabric crushed several times in comparison with control piece.

(d) (ii) Durability test – sandpaper rubbed on fabric and compared to control.

Average Responses

(a) Nominated a team sport and understood the concept of a formal uniform. Criteria were listed, considering the nature of the team, international travelling, the special needs of a team uniform and, where applicable, to a uniform worn at formal functions.

(b) Sketches were large, clear and used the figure provided. Back and front views showed the whole design. The sketches illustrated the features such as collar, long sleeves, tie, etc. required for a formal outfit. Colours were indicated by labelling or simple shading, and construction lines were labelled.

(c) Fabric named, and the choice justified by reference to criteria listed.

(d) Two appropriate tests were given and well explained.

Poor Responses

There was a lack of understanding of the phrases 'uniform to wear at promotional functions' and 'formal' so that only properties of a sporting uniform were given.

(a) Sketching was small, often unclear, lacking a back view or total view. The figure provided was not used, resulting in disjointed and hard to see detail. There was little labelled information and few, if any, construction lines.

(b) Candidates had little knowledge of fabric names or gave no reasons for their choice.

(c) Named tests were inappropriate for this type of garment and no details were given relating to the test.

Question 9

Example of an excellent response

(a) Lycra/nylon knit – great impact on leisure and sports wear, which is growing in demand due to changes in social attitudes to lifestyle relating to diet and fitness.

Lycra – elastomeric yarn – has excellent stretch, crease resistance and wrinkle recovery, therefore it is easy-care. Lycra possesses figure-hugging properties as well as giving freedom of movement and comfort.

Nylon – strong fibre, gives durability and strength. It is a hydrophobic fibre and is therefore quick drying and reasonably resistant to chemicals, eg swimming pool chemicals.

Knit structure – accentuates properties of lycra, giving comfort and ease of movement. Knits meet the fashion needs of today and are relatively cheap.

(b) (i) Clear sketches of swimwear or leisure wear, well labelled.

(b) (ii) For swimwear

- listed and justified.
- quick drying, hydrophobic nature of the fibres
- fade resistance, the synthetic fibres can be dyed with disperse dyes which resist fading
- dimensional stability and figure hugging ability, elastomeric yarns and the knit structure give it the ability to spring back into its original configuration.
- durability, the properties of the nylon fibre.

(b) (iii) Two constructions were chosen and fully described with diagrams – curved hems at the leg of swimming costume, sleeve inset in leotard, lining of a top for a sporting team.

(b) (iv) Choice of the important design ideas that would promote the garment sketched in part (b) (i)

- floating nature of the garment
- strength and hard wearing properties

– easy care proportion
– bright/fashionable colour
– value for money.

Average Responses

(a) Candidates possessed a good knowledge of the changes in our lifestyle over the past 20 years, such as being more active, awareness of need for exercise, more people going to gymnasiums.

(b) (i) Clear, fully labelled sketches showing all design lines.

(b) (ii) Performance criteria appropriate to the garment designed were listed and explained.

(b) (iii) Construction techniques, clearly sketched, were appropriate to the fabric and design – explained in detail.

(b) (iv) A range of features – including those relating to lifestyle and new fabrics.

Poor Responses

(a) Ignored the impact of new fashion requirements and lifestyle trends, while fibres and fabrics were confused.

(b) (i) Sketches missed design lines, eg crotch seam; little, if any, labelling. Often candidates did not sketch the whole outfit, eg only gave trousers. Outfits were not suitable for the chosen fabric.

(b) (ii) Candidates showed poor understanding of the term 'performance criteria'.

(b) (iii) Confused outfit construction techniques with fabric construction. Students gave a list of steps for making the whole garment or just named a construction technique, but did not sketch or describe how it was done.

(b) (iv) This part was generally answered satisfactorily.

Question 10

Example of an excellent response

(a) Design Brief

The student was required to design a textile item made from 100% cotton with a personally decorated fabric.

Sketch – Chevron design applied by screen print. Clear, fully labelled including fabric (not just fibre), eg cotton percale, colour scheme (black and white) and construction technique of double stitched seams for durability and buttonholes for fastening.

(b) The design process developed as follows:

1. The brief was analysed and the problem recognised, important features of the brief were identified in that the fibre must be 100% cotton and the fabric must be decorated personally in some manner.

2. Ideas were generated ie, clothing or home furnishings, embroidering or screen printing, knit or woven fabric, age group appropriate.

3. Solutions were listed. It was decided to design and make a quilt cover for an adult's bedroom decorated with screen print. Design sketches were generated and a chevron motif was decided upon, with a bold black and white colour scheme, as this reflected the sophisticated adult market. A number of fabrics were explored and cotton percale fabric was decided upon as this is a soft, luxurious fabric that is suitable for the end-use.

4. Research and investigation into the amount of fabric required took place. Type of fastenings most appropriate and the type of paints needed were decided upon. Experimentation in applying the decoration also occurred.

5. Manufacture of the item then took place, including screen printing the fabric then constructing the quilt cover.

6. The finished product was finally evaluated to ascertain whether it fulfilled the brief – which it did – and whether the end-product was well made. Evaluation also took place during the design process in order to make the best decisions.

(c) The design was then modified in that a quilt cover for a different age group – children – was designed.

The original idea was suitable for adults due to the striking, formal design and the black and white colour scheme. The quality of the percale fabric justified the expense, as it was for a quality adult's bedroom. In designing this item for a child a cheaper, more durable fabric was chosen – cotton gaberdine – and the colour scheme selected involved bright primary colours with an aquatic design – repeating the chevrons in the fish tails. This suited the end-use of a child's bedroom better as the fabric was less expensive, more durable and easy care. The bright cheerful colours and the design appealed to children's imaginations.

(d) Sketch – clear, all design and construction lines indicated (eg, closure of buttons and button holes).

Fabric and colour scheme shown and labelled.

Average Responses

(a) Design brief was clear, succinct and appropriate.

Sketches were correct in that all design and construction lines were indicated. Sketches were labelled, fabrics (not just fibres) were indicated, as were colours and construction techniques.

(b) The design process was well understood and examples were given in each step. The design process showed a progression.

(c) A modification from the original was shown, although common aspects were present, eg the same item with a different colour scheme or fabric or similar fabrics or colours with a different design.

(d) Sketches were correct in that all design and construction lines were indicated. Sketches were well labelled and fabrics shown. A construction or decoration technique was explained.

Poor Responses

(a) Candidates failed to understand the term ‘design brief’ and simply described something they had made.

Sketches were poorly labelled (or not at all) and design/construction lines were not shown. Fibre (eg, 100% cotton) was given but no fabric indicated.

(b) These candidates showed no understanding of the design process, discussed steps of making the item but gave no evaluation.

(c) In many cases no modification took place, a completely new item or the same item shown.

(d) Sketch – Unclear, design and construction lines were not shown – little or no labelling was included.

Question 11

Excellent Responses

(a) Similar colours – greens, blues (identifying a specific colour scheme). Interesting justification for choice, eg cool colours – illusion of space; bright colours – stimulate, emphasise speed, movement of train and keep people moving in busier areas of train; dark colours hide dirt; whites help small spaces look larger. Landscapes could represent symbolism, yellow represents wattle.

(b) Sketched two contrasting motifs. Labelled with colours and general explanation, eg curved lines give feeling of gentility and the serenity of the passing scenery. Two distinct but harmonious designs, perhaps stylised Waratah or flowers of the eastern states, Kangaroo superimposed on the sun. Labelled all features on sketch; commentary was connected directly to the feature.

(c) Further developed their motifs by alternating and merging, reversing, substituting, magnifying their designs. Showed placement of each design on each product, where best suited; motif used such techniques, repetition, graduating patterns.

(d) Stated a technique which was suitable and gave reasons to show why it was appropriate,, eg screen printing, as design needed on only one side, consistent, even print, quick, cheap. Use of aspects of original design by changing colour and layering of screens, lends itself to strong eye-catching graphics and stylised motifs.

Average Responses

(a) Candidates named colour scheme and gave appropriate examples of colours for each scheme, justifying their choice.

(b) Students understood the term ‘motif’, developing two suitable motifs, taking note of the requirements of the question. Labelled fully and clearly justified both sketches.

(c) Candidates could adapt the motif to each of the items listed, using a variety of techniques to best suit the position on the item. All diagrams were clearly labelled including colours.

(d) Candidates expressed a good knowledge of the most appropriate technique for applying/incorporating the design to one item. Justification was relevant.

Poor Responses

(a) Candidates chose one colour rather than a colour scheme. Had difficulty in justifying their choice of colours e g. simply saying ‘blue’ to represent the sky – ‘yellow’ for the sun etc;

(b) Sketched two things that were shapes, rather than motifs, had difficulty in producing two motifs which contrasted. No colour was given and there was no justification.

(c) Did not further develop original motifs.

(d) Gave unsuitable techniques with no justification.

3 UNIT

Section 1 – Science and Technology

Question 1 Fibre Structure

Question 1 (a)

Example of an excellent response

(i) Molecular structure:

- based on polymer chain sequence and length
- basic concepts of crystalline and non-crystalline (amorphous) regions.

Morphological structure:

- based on features of fibre structure, usually visible under light microscope but may require electron microscope.

(ii) Wool: natural fibre

- ∂ keratin fibre, amino acid groups
- importance of hydrogen bonding and disulphide bonds
- ∂ helical crystalline regions, ∂ B transition, amorphous matrix
- morphological structure, microfibril-matrix < macrofibrils < cortical cells < orthocortex + paracortex structure (merino only) < encased in scale structure.

Polyester: man-made fibre

- polymer ester, typically PET (polyethylene terephthalate)
- long-chain polymer
- crystalline/paracrystalline structure
- little given in the way of morphological structure under light microscope, fibre cross section can be engineered in regard to shape, eg circular, trilobal.

Strength: typically, wool > polyester due to molecular structure and ∂ B transformation in wool.

Elongation: wool > polyester, due to ∂ B transformation

Thermal stability: because of molecular structure + crystalline regions. Polyester – melting point 250°C with softening at 20°C. Wool – dependent on moisture content.

Moisture Absorbency: Wool up to 30% own weight. Polyester very little, < 1%,

Wool has matrix + hydrogen bonding, polyester is highly crystalline.

Elasticity/resilience: Wool – up to 20/30% elongation then return to original length if plunged in water. Polyester good, providing not passing yield point, as has less recoverable strain capacity than wool. Molecular structure + ∂ B transformation.

Lustre: Wool defused reflection due to scale structure and general circular fibre. Polyester can be engineered, thus surface modification to the degree of lustre required. Due to morphology.

Flammability: Wool does not support burning, in flame sizzles and curls leaving dark ash.

Polyester burns slowly and melts in flame (difficult to burn when flame removed) because of its molecular structure.

(iii) Wool: apparel – business suit; non-apparel – carpet

Polyester: apparel – lingerie; non-apparel – geotextile.

Average Responses

(i) Candidates clearly defined terms, giving a range of responses.

(ii) Selected natural and man-made fibres, set out answer in logical manner and referred to the property in relation to both the molecular and morphological structure of the two fibres.

(iii) Listed suitable end-uses for each fibre.

Poor Responses

Here candidates had poor concept of the molecular and morphological structure of fibres and could discuss properties of the chosen fibres only in general terms; few could give structural reasons for these properties.

Question 1 (b)

Excellent Responses

(i)
- Linear and cross-linked polymer chains mainly influence fibre strength – polyamide chain – presence of specific groups along the chain that can participate in interchain bonding, eg: amide groups in polymides for H bonds. OH groups in cotton form H bonds, disulphide cross-links in wool form strong bonds.
- Interchain attraction mainly affects strength. Types of bonds are listed in ascending order according to strength. Van der Waals forces – very weak between neutral molecules.

  Hydrogen bonds – weak dipolar forces between such groups as OH, NH2. hydrogen and oxygen.

  Ionic or salt links – the force between opposite charged groups (radicals) have a very strong interchain attraction.

  Covalent bonds – fixed link between molecules sharing electrons.
- Crystalline and Amorphous arrangement of chains.

  Amorphous-molecular chains are disordered, random arrangement (may be explained with diagram). This can influence absorbency in that fibres with more amorphous

regions are more absorbent and have good dye affinity. They also have greater elasticity and less strength.

Crystalline-molecular chains are parallel and contribute to molecular structure – they are stronger, more rigid, durable and less absorbent.

(ii)

	COTTON	WOOL
Strength	Fibre convolutions and fibres rotating in alternative directions for each layer on the fibre axis contribute to strength and interfibre friction. The convolutions partly disappear as the fibre absorbs water (or is mercerised).	Para cortex in inside of spiral – more rigid ortho-cortex on outside of spiral, therefore more flexible.
Absorbency	Convolutions and airspaces contribute to absorbency, the more air spaces, so more water absorbed.	Amorphous fibre allows more water to enter.
Elasticity	Low due to convolutions on surface, prevents fibre from returning to original position.	Helical shape of polymer allows good flexibility and elasticity.
Warmth and comfort	The fibre convolutions cause random contact with the skin, therefore the fibre feels comfortable, crisp and cool due to rapid moisture absorbency.	The crimp prevents close packing of fibres. Air spaces allow for warmth and insulation; they are also absorbent due to high amorphous regions.

(iii) Method to investigate morphological structure of fibres. Microscopic observations, fibres are mounted to provide views of both their lengthwise and crosswise dimensions. Example – cotton under the microscope shows ribbon-like convolutions usually collapsed and irregular in size.

Average Responses

All of these responses included more than the necessary information, showing their understanding of the topic.

(i) Candidates had a good understanding of the properties that these influenced. They could give appropriate examples.

(ii) Good comparisons were made. The answers were set out well.

(iii) Candidates understood the process of investigation and were able to explain it well.

Poor Responses

Terms were confused. Little understanding was shown of the molecular structure of fibres and discussion of cotton and wool was poor. The properties of the fibre were discussed generally, without reference to the morphological structure.

In these responses candidates could not relate to any method used in the investigation of fibres.

Question 2 Colour

Question 2 (a)

Excellent Responses

(i) Munsell System –

uses psychological dimension of colour – hue, saturation and lightness,

- relies on visual matching, using colour atlas, a colour chart made of thousands of small coloured chips arranged according to hue, chroma and value,
- a system of describing all possible colours in three co-ordinates arranged in a 3-D solid,
- Hue – 5 principal colours – red, yellow, green, blue, purple; and 5 intermediary colours red/yellow, yellow/green, green/blue, blue/purple, purple/red on a circle,
- Value – 1 to 9 on vertical axis where 0 is white at the top and 10 is black at the base. The grey scale is the ‘trunk’ of the solid.
- Chroma – 0 neutral to 10 pure colour, horizontally from the centre to one side, with the complementary colour on the opposite side.

Specification – hue value/chroma, eg 7YR 4/6 and relatively pure orange colour.

CIE – Commission International d’ Eclairage

- based on Trichromatic Theory concept of addition mixing so that the stimulus of colour is provided by the combination of a light source, an object and an observer.
- specified by 3 co-ordinates – X, Y, Z corresponding approximately with redness, greenness and blueness called tristimulus values.
- a colour metre from reflectance at 3 specific values X, Y, Z, which are determined from the reflection of 3 specific wavelengths.

From values X, Y, Z, the values of x and y are calculated.

Equation $x = \frac{X}{x + y + z}$ $y = \frac{Y}{x + y + z}$ where $x + y + z = 1$

The colour is completely specified by x and y, and Y, where Y is the luminous reflection (brightness of colour)

- with only 2 variables, x measures red and y measures green, each colour being plotted on a graph. Blue appears where both x and y are very small

Centre spot represents white (x = 0.33) + (y = 0.33) + (z = 0.33) = 1

(The CIE Chromaticity diagram given)

(ii) Sky blue, navy, delft, sapphire, turquoise all describe some hues of the colour blue. It is difficult to be specific for the benefit of a dyer, printer, dye manufacturer. They cannot possibly identify exactly what colour is meant. It is hard to provide a formula, recipe, etc to enable the exact reproduction of a colour. Colour specification gives the exact colour required.

(iii)

	Advantages	Disadvantages
Munsell.	Does not require equipment, is purely visual. The colours are visible, can be seen when choosing. Inexpensive for small amounts of use.	Not always accurate as individual perception is required. Atlas or colour samples can become dirty or worn. Different when seen under different light sources.
C.I.E.	Number base – very accurate – no human visual error. Cost effective if used a lot. Surrounding lighting does not affect measuring.	No colour visible when matching or deciding on colours. Expensive to establish.

(iv) Manufacturer – C.I.E. – objective method

Company buyer – Munsell – subjective method

Average Responses

(i) Candidates were able to give detailed descriptions of both the C.I.E. and Munsell systems of colour specification.

They clearly explained a variety of reasons for having colour specification, and were able to list the advantages and disadvantages for both systems and could identify the correct methods of colour specification for the two situations given.

Poor Responses

(i) Here candidates could not give detailed answers on both systems. Diagrams were poor and inappropriately labelled. Information was mixed, with the wrong method frequently being given.

(ii) Here colour specification in general was discussed but the reasons for its use were not given.

(iii) In this part candidates could list several advantages and disadvantages of both methods of colour specification but confused the points of the two systems.

(iv) The wrong specification for the two situations was given.

Question 2 (b)

Excellent Responses

(i) Many things can affect the way in which humans see colour so, if an exact method of colour measurement is required, some type of instrumental system must be used.

- The quality of the light will affect the perceived colour.

  Tungsten light, being rich in red and poor in blue, will tend to make colours appear more red than the same colour in sunlight, which is slightly richer in blue wavelengths.

- Light intensity: with bright illumination, the iris of the eye closes and most colour sensitiveness decreases.

- The viewing background: contrasting colours can affect colour perception and generally colours are compared against a neutral background.

- The observer may have a defect in colour vision; each person 'sees' colour differently: past experiences and mixed emotions and the age of a person can affect the seeing of colour.

(ii) The Spectrophotometer

- Breaks light up into bands of different wavelengths by means of a prism, and each band is directed at the sample in turn by rotating the prism.

- The light is reflected from the sample.

- The amount of reflected light is measure by a photocell.

- The results from the photocell are charted on a graph shown on the video screen of the spectrophotometer.

(iii) Metamerism occurs when two colours match under one form of illumination eg sunlight, but look quite different under a different light, eg tungsten filament.

Metameric matches may be minimised by ensuring that the spectral reference curves of colours to be matched are as close as possible to identical. This means that they should appear to match under any form of illumination. This assists commercial dyers in giving more accurate colour matching. The use of the spectrophotometer allows consumers to match accessories for their domestic use more accurately. Dye match predictions are

available within minutes with the use of a spectrophotometer whereas visual colour matches can take hours of trial and error.

(iv) Firstly the colour is measured, then specified in terms of the X, Y and Z tristimulus values. These values can then be used in a computer program to predict a dye recipe from a mixture of three dyes. This takes the 'guesswork' out of colour matching: it is totally accurate.

Average Responses

(i) Detailed description of how the eye perceives colour and a discussion of the effect that different situations have on colour perception.

(ii) Clear description and good diagrams were given with correct terminology.

(iii) Metamerism was discussed as well as the reasons for the correct matching of material by the consumer.

(iv) In these responses the benefits of computerised colour matching, especially for the textile dyer, were clearly indicated.

Poor Responses

Many candidates attempted only part (i) of this question. Understanding of the total question was poor since a number did not understand the spectrophotometer, neither did they understand the principles of colour matching. They failed to use correct examples or provide relevant information.

Question 3 Technological Developments

Question 3 (a)

Example of an excellent response

Technological developments, commercial demands including international competition, consumer demand and needs have led to the development of new textiles. All have contributed to product and process development in medical, architectural and agricultural fields. In each context fibre production and manufacturing developments can be planned to meet specific requirements determined by situations, trends, designers. Technological progress has been pushed to boundaries enabling demands for specific properties to be met. Fibres can be tailored to suit, and production efficiencies catered for prior to manufacturing.

Medical textiles – including gowns, bandages, swabs, bed covers, sterile wraps.

Hybrid technology – laminate of spun bond and spun bond melt blown, for use as sterile wraps for medical instruments.

The property demands of the fibres: medical instruments used in operating theatres can be sterilised, wrapped with hybrid fabric thus preventing contamination until open and used.

To manufacture: fabrics formed by two different methods are joined together to yield properties unobtainable by a single non-woven process. Spun and melt bond fabrics are brought together, the spun bonded fabric provides strength and puncture resistance, with the melt blown fabric layer

acting as a filter and barrier against foreign bodies and hazardous material. Made from polypropylene fibre, the fabric has good chemical resistance.

Architectural textiles – Concrete venues, walkways, semi-permanent exhibition sites, sunshade. The fabric envelopes are lightweight structures on building constructions and meant particularly for public use. The envelope structures utilise textile materials for the roofing canopy and for side walls. There are two types – air-supported and tensioned structures.

Air-supported structures rely on air pressure for integrity while tensions maintain shape and forms by a series of support masts and cables.

Property demands of the fibres: they need to be strong, chemically resistant, water-proof, abrasion resistant, self cleaning and flexible. They must be capable of being prefabricated and quickly erected and disassembled and they must be cost effective. Flexibility is very important to allow scope in design. Architectural envelopes consist of a woven base fabric and coating. Polyester is most commonly used in the base while PVC and Polytetrefluoroethylene or teflon is used as the coating.

Agricultural textiles – A portable grain silo, although other types are more permanent and expensive. These allow flexibility for coping with greater than expected yields, giving immediate storage space. On the other hand, during harvest time, they can be moved wherever needed for short or long periods of time.

The textiles used need to be pliable, strong, moisture-proof, chemical-proof and heat-resistant to protect stored goods from environmental conditions. They are woven using 100% polyester filament yarn and then coated with PVC (polyvinyl chloride).

Average Responses

There were very few responses for this question and the candidates generally had very little knowledge of the identification of new fibres or their areas of application.

Question 3 (b)

Example of an excellent response

There are many reasons for much greater increase in fibre consumption.

- The changing pattern of fibre consumption

  50 years ago most fibres used were natural fibres – cotton, wool and, to a lesser extent, linen and silk. This applied to all areas of fibre usage – fashion, domestic and industrial.

  Now the use of man-made fibres, especially synthetic fibres, has expanded dramatically. These new fibres have taken over traditional roles of textiles, but have also found new uses, eg geotextiles, medical, building etc.

- Production of new fibre types

  Improvement of natural fibre production, yarn and fabric structures in finishes have resulted in new fibres that can be used in areas once not thought of, eg on the nose cone of the US space shuttle, as an artery replacement, in hi-tech fabrics to help an athlete achieve a faster/higher standard in sport. The blending of natural and man-made fibres help to

accentuate the best property of each fibre. New fibres with new and improved properties have been produced.

- Techniques of fabric manufacture

  Techniques have become much faster and more versatile, therefore they result in cheaper production.

  Greater variety of fabrics can be produced to meet many new needs.

  Traditional methods of weaving/knitting have been improved, with the newer fibres of bonding/non-woven, fabrics being produced especially in the industrial, agricultural, industrial fields. Many of these fabrics are now being used for purposes not previously thought of as being a fabric domain.

- Techniques of commercial garment production

  Earlier this century all pieces of garments were cut separately and sewn individually. Today computers control pattern-making, and this results in the cutting of layers of fabrics simultaneously. These are faster, more economical and result in increased production.

  Garments have simpler designs than those in earlier times and are designed to be constructed more quickly and cheaply.

  Many sewing machines are multi-functional, eg baby singlets – the necklines are finished off, the lace and elastic added in one process and finished off automatically.

  Computers and robots are taking an increasingly more important role in this section of the industry.

- Development of the non-apparel textile industry:

  On so many fields fabrics are used in:

agriculture	–	wind resistance
architecture	–	sound proofing, shade areas
medical	–	protection from infectious diseases
geotextiles	–	road building
industry	–	conveyor belts
transportation	–	tarpaulins with side entry allowing much faster loading of trucks, thus saving the transport industry money.

Average Responses

Here candidates understood the direction of the question and discussed each point, giving sound examples. They could distinguish between each point and gave different examples, but also realised the influence of one point on another.

Poor Responses

In these responses candidates showed very little knowledge of the topic. They could not comprehend the advances of technology today and so were unable to make any sound projection for the future.

Section II – Design

Question 4 History of Clothing Design

Question 4 (a)

Example of an excellent response

The 20th Century has seen more changes in fashion, lifestyle and habits than any other time in the history of mankind.

Modesty:

- changes in lifestyle, values are changing, acceptance of clothing standards from the stiff, formal Edwardian era to the influence of today's bathing.
- women's new status, change in length of skirt, style of clothing.
- sport has become important to women in this century and accepted clothing has been revolutionalized.

Technology:

- change has been rapid.
- transport-from the predominance of the horse as the major form of travel to space travel.
- communication – people can see what is happening all over the world as it happens, eg a fashion parade in France.
- the availability of today's clothing and fabric – manufacture in high technology
- speed, variety of production.
- new technology brings new fashion eg plastic clothing, the wet look.

Cultural integration:

- displacement of people after major wars, eg World War II, people took their ideas and traditions with them.
- travel makes interaction easier, bringing cultural traits and influence.
- trends adapt different styles of dressing and fashions.
- Western clothing now dominates in most business areas of the world.

Resource availability:

- as technology advances, availability increases
- diversity of fibres, fabrics, yarns, finishes and dyes
- variety leads to expanded wardrobes, each event requires a different style of fashion.

Ideas of beauty:

- follows the fad/world events, eg the flapper in the 20s as the flapper-era led to a freer lifestyle for women – the War years, uniforms became fashionable, the return to peace; the 'New Look', the teenage era with the influence of pop stars, space travel, mini skirt to 'anything goes in the 90s'.

Average Response

There were very few responses to this question and most were poor. There was little knowledge of the terms used and candidates failed to discuss the points necessary to answer this question.

Question 4 (b)

Excellent Responses

(i) Choice of culture should be suitable for designing a contemporary version of a traditional garment; an example could be an Indian sari.

(ii) A well labelled sketch was given of the traditional garment.

(iii) Sketch showing a contemporary adaptation of the Indian dress, suitable for today's fashion but having direct design references to the traditional outfit. The sketch should be well labelled.

(iv) Instructions for comparison

Traditional

- Availability of resources – the fabrics that are readily available are cotton, ramie; would be dyed with the local natural dyes.
- Customs and traditions – dress will signify whether the woman is married or not, and the amount of jewellery shows the wealth of her family. Techniques of garment construction and decoration include such things as the style of the sari, the appropriate use of dyes or colouring, the art of mirroring (attaching small mirrors to the fabric) to reflect the inner soul.
- Religious beliefs – a large percentage of the Indian population are Hindu and this has a considerable influence on dress, eg the length of skirt, which must cover legs. Traditional dress must be worn at festivals.
- Ideals of beauty and modesty – traditional beauty is something that is inner rather than outer, but beauty is shown through very bright colours, intricate embroidery and dyeing techniques.

Contemporary

- Reflects availability of resources – due to modern technology, most fabrics are available and the properties of the fabric indicate reasons for its choice. Shaping of outfit can be done with seaming and fastenings are also available – it is a matter of choice. The outfit could be constructed by the wearer, a dressmaker or could be available 'off the rack', ie mass produced.

- Customs and traditions – few customs affect the choice of clothing, but certain occasions may affect the choice, eg a formal or semi-formal occasion, a wedding.
- Religious beliefs – apart from ritual type of garments, religion has little effect on clothing, except in certain celebrations, eg weddings or christenings, which will influence some clothing.
- Ideals of beauty and modesty – a different lifestyle and relaxed modesty allow skirts to be worn at any length; split skirts, lower necklines, sleeveless garments, etc are generally accepted.
- The idea of beauty is very strong, 'thin' is beautiful and many try very hard to be thin. Bodies are shown off by tight fitting clothing.

Average Responses

(i) An appropriate culture was selected.

(ii) The traditional design was fully sketched and labelled and included surface decoration etc.

(iii) Contemporary sketch showed a link to traditional sketch, and was a modern design; these were well labelled.

(iv) Information was related to both outfits and showed a good understanding of both cultures.

Poor Responses

Here candidates showed little knowledge of their chosen cultures, failing to link their sketches to a contemporary garment, merely repeating the traditional design.

Gave little or no direction for the benefit of the compere of the fashion parade.

Question 5 Theatrical Design

Question 5 (a)

Excellent Responses

(i) The main character's appearance, personality and situation within the story were clearly explained.

(ii) Sketches – very clear illustrations of the costumes of the main character. Style lines, decorative details would be shown and related to the character. Information would be given regarding fabrics, colours and shaping techniques to be used. Innovative and appropriate designs; the costumes would show two quite different styles for the main character.

(iii) Identify differences between functional and aesthetic features. Functional features should take into account the need for quick changes, which might include an invisible zipper hidden under a line of buttons, the need to be durable for continual wear. In live theatre costumes are worn over and over again, so the need to clean the garments is important. When designing and choosing styles and colours consideration must be given to their suitability and their colour under the lighting used. 'Shading' and other techniques can be used to hide figure differences of actors when their stature is different from that of the character they are

portraying. Aesthetic features should consider the suitability of the garment to enhance the personality of the character and its suitability for the era in which the play is set. Colours can be used to emphasise the social position of the character, eg purple for royalty, while accessories must accentuate the importance of the character in the story.

Specific features included on the design must be identified and reasons for their choice explained.

(iv) Give technical details of lights and atmosphere created by various colours – related to the performance – fresnel spots – to create a soft shape around the main character, fairy lights – to enhance the mood of a fairyland scene; coloured filters – to create feelings/atmospheres, eg sad, horrifying, mystical – beam lights – to create shafts of light, floodlight – to light the scenery for daytime scenes.

Relate colour psychology and additive colour mixing to the mood of the play.

Average Responses

(i) Candidates were able to describe their chosen character, giving a clear picture of the play and character they were going to dress.

(ii) Sketches were excellent, very clear and very well labelled.

(iii) Candidates had a good understanding of functional and aesthetic properties required for the outfits of their character.

(iv) Understood use of lighting and the necessity to choose the lighting effects that would best suit the mood of both play and characters.

Poor Responses

(i) Candidates gave details of the story but did not discuss the main character.

(ii) Only one costume was drawn and this did not reflect the story or the personality of the character. Few labelling details were given.

(iii) Could not use appropriate terminology for functional/aesthetic qualities. Combined all information.

(iv) Possessed no knowledge of types of lighting, gave general information which did not relate to the production.

Question 5 (b)

Excellent Responses

(i) Choir member, dance member and master of ceremonies should be easily identified and fit into the theme.

- fish, fins, seaweed, floating construction
- all construction lines should be clearly visible
- openings to costumes to allow for ease in putting on and taking off
- colours (blue, green, silver, gold, brown, bright)

- suitable fabrics could include lycra, satin, voile, chiffon
- textures rough to imitate scales, or soft and smooth to imitate water.

(ii) Colours – tropical, sea animals, cool ocean.

Textures – sequins imitate scales, shiny lycra reflects the ocean and the sun glittering over it.

Fabrics – lycra for ease of movement, satin for lustre, sequins for texture and shine.

(iii) Résumé of the total construction with details, maybe well labelled sketches, from the pattern alteration and the cutting out to the fitting and sewing as well as finishing and decorative techniques. The differences between constructing for theatre and for everyday wear should be noted.

(iv) Lighting required to give atmosphere of the ocean – blue/green tinge. Fresnel spots, footlights, but stage must be well lit in order to maintain a bright and happy atmosphere. Also the need for safety of movement at presentation night must be remembered. Music – sounds of the ocean, water, may be tropical.

Average Responses

Students showed imagination and a clever understanding of the concepts related to theatre arts, as well as a good knowledge of construction methods needed for a theatre costume.

Poor Responses

(i) Showed little relationship to the theme of the ocean. Costumes did not co-ordinate, lacked construction lines/design details, labelling was very poor.

(ii) Little or no justification of choices was made.

(iii) Only one technique was given and this was poorly discussed.

(iv) Little knowledge of lighting or music was apparent.

Question 6 Fabric Design

Question 6 (a)

Excellent Responses

(i) Batik – a wax resistant method of dyeing.

English quilting – stitching on padded layers of fabric.

(ii) 'Dancing Horses' – the fabric first batik dyed, then stitched using quilting techniques.

Batik – gives the horses texture, with the sketched outlines of the horses against the dark background. A simple two colour method would be used with the background and the body of the back horses the first colour and the front horse with sketched outlines, and back horses the second colour.

Two colours would make up the background as some of the natural cream of the fabric would be left undyed.

Quilting – the quilted lines of the sketch lines, including the outline of the horses, would be sewn in a slightly darker colour to emphasise the overall design. Quilted fabric gives warmth and wind protection to the outer garment.

(iii) Sketch showing the placement of the repeat design of horses in border formation. Quilt stitching would be used for the top portion of the fabric (to hold all 3 fabrics together).

(iv) The outer fabric would be dyed.

- Wax applied to front horses and sketchlines on back horses with wax on areas to be left undyed. Dye the fabric in light turquoise.
- Rinse and drip dry
- Remove wax
- Apply wax to all areas except front horse and sketch lines of other horses.
- Dye in navy
- Rinse and remove wax

To prepare for quilting.

- Place fabric on top of lining and wadding
- Baste all three fabrics together
- Stitch lines around horses and on the feature of the horses, tie off ends.
- Complete the fabric treatment by quilting lines above the design.

(v) Sketch the finished jacket, with border along base of jacket and at end of sleeves. This needs to be labelled well.

Average Responses

Showed a clear and logical sequencing of the two techniques from conception, through application to fabric length, then as design features on casual wear garment. Sketches were well labelled and information was easy to follow.

Poor Responses

The answers from these candidates showed no logical sequence and gave very little information about the decorative techniques asked for.

Question 6 (b)

Excellent Responses

(i) Banners have to be relatively simple in design. Plate 3 was chosen and stylized to have more than four creeping flowers, placed diagonally with enough room for the shop name in the

bottom right hand corner. The light colour of the flower was depicted as off-white with a dull gold stamen and brown stem. The background was dark – bottle green, to reinforce the inspirational material. The shop name was off-white accentuated by the colour of the petal.

(ii) Candidates made good use of the inspirational material, adapting the illustrations best suited to the article chosen.

(iii) The banner would be double-sided and interlined with a strong calico to give rigidity. The design would have been placed on the banner first – the flower petal appliquÈd and the stamen quilted to give the three dimensional effect. Wadding would be used under the petal and a machine zig-zag used to hold the fabric. There should be three layers, the middle layer a thick wadding for the quilting, with machine stitching being used for the quilt. The quilt lines would be in the shape of the stamen markings, stem quilted, but with fewer lines and with little cross stitching.

The shop name would be in machine embroidery.

The two sides with interfacing would be placed right side together and sewn as a bag then turned through. Tabs over a wooden rod would finish off the banner, with rivets being used to complete the holding.

(iv) A rectangular calico shopping bag – two-sided with handles in the bottle green dyed canvas. One flower with stamen diagonally across the bag – screen printed in the same colour as the banner. The shop name would also be screen printed.

Average Responses

(i) These showed good design concept, sketching and labelling were clear and included all details of fabric, colour and textures.

(ii) Candidates made good use of the inspirational material, adapting the illustrations that were best suited to the article chosen.

(iii) Candidates showed very clearly that they understood appropriate construction techniques and decorative techniques appropriate to the product chosen.

(iv) They were able to make enough changes to the design to show their understanding of an adaptation of a design to a motif. They understood the term ‘motif’.

Poor Responses

(i) Here candidates showed poor design skills. Sketching was unclear and labelling of fabric, colour and texture was generally missing.

(ii) Candidates did not relate the design to the inspiration.

(iii) Techniques chosen were not suitable for the articles and place chosen. The explanation lacked detail, showing that there was little understanding of either construction or decorative techniques.

(iv) Candidates did not know what a ‘motif’ was and so were unable to adapt from the main design.

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