

MARKSCHEME

May 2006

DESIGN TECHNOLOGY

Higher Level

Paper 3

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Option D — Food technology

D1. (a) *Award [1] for each type of information.*

expiry date;
safe storage details;
serving information;
ingredients;
additives;
warnings;

[2 max]

(b) *Award [1] for the identification of a food product, and [1] for each of the health-conscious reasons for its development.*

low fat milk;
desire not to be overweight;
desire to consume less fatty foods;

naturally sweetened candy;
consume less sugar;
avoid infected teeth;

modified with additives;
balanced nutritious diet;
certain vitamins needed;

[3 max]

D2. *Award [1] for each of two points in a description.*

pasteurization involves heating;
heat kills the micro-organisms/harmful bacteria;

[2 max]

D3. *Award [1] for each of two points in a list.*

protein;
fat;
carbohydrate;

[2 max]

D4. Award **[1]** for the identification of a food and **[1]** for a description of the result.

wheat;

genetic modification to be drought resistant;

chickens;

selective breeding to increased chicken weight;

tomatoes;

genetic modification to make them larger and redder;

soya bean;

resistant to herbicide/pesticide;

crop yield increased;

[2 max]

D5. Award **[1]** for each of three factors and **[2]** for a discussion of two points in each factor.

temperature;

must be sufficiently high;

if too low will not kill bacterial growth;

time;

sufficient time to cook well;

if not cooked through may still support bacterial growth;

size;

food is a poor conductor;

so larger mass of food takes longer;

initial temperature;

if frozen may need to be thawed first;

or the centre may never get hot enough;

method of cooking;

microwave will have time and level requirements;

fan assisted oven may require lower temperature;

open fire may have variable temperature;

cooling;

if left to cool in heating appliance, greater risk of bacterial growth;

if kept warm for a long time, greater risk of bacterial growth;

[9 max]

Option E — Computer aided design, manufacturing and production

- E1.** (a) *Award [1] for each of two points.*
quick response to design changes;
graphic and clear presentation of ideas;
enhanced communication/consumers can understand designers ideas/ideas sent over distance, eg internet; *[2 max]*
- (b) *Award [1] for naming a criteria and [2] for stating the reason why.*
desired outcome;
 type of interiors to be designed;
 how images are to be presented;
 format for clients to read;
time;
 time to learn package;
 time to develop images required;
 extensive training required;
cost;
 relate to size of organization/volume of production;
 becomes a fixed cost of production;
extra features;
 features to suit the type of modelling;
 such as walk-throughs;
 provide production drawings;
designers needs;
 able to paste in furniture and backgrounds;
 extensive library of components;
 provides all essential features; *[3 max]*
- E2.** *Award [1] for identifying the resource and [1] for why it conserves resources.*
time;
 may use previous designs and change them;
- materials;
 done on computer, so less materials used;
- energy;
 no materials for physical models need to be produced or processed; *[2 max]*
- E3.** *Award [1] for each point in a list of two points.*
new skills required/training;
cleaner work environment with CAM;
work may be done in remote location;
may get laid off because fewer workers required/redundancies;
safer working environment; *[2 max]*

E4. Award **[1]** for identifying a quality and **[1]** for one point in a description.

diagnostic / problem solver;

able to diagnose problems;

able to fix problems / repair equipment;

quality control;

able to undertake their own quality control;

team worker;

work as part of a team;

responsible;

take responsibility for their own work;

positive work ethic;

multi task/skilled worker;

able to undertake range of tasks in a team;

able to adapt to different work;

self motivated;

must be able to work without supervision;

[2 max]

E5. Award **[1]** each for the identification of three reasons **[3 max]** and **[2]** for a discussion of each reason **[6 max]**.

Mobility of capital;

Increase in international investment;

Investment opportunities are global;

Financial incentives from host country;

International trade;

To increase volume of trade;

Transport vehicles, eg shipping supports international trade;

Markets;

Markets now global/to reach greater markets;

Companies need to access more markets;

Better able to meet diverse markets needs;

Introduce new products to more markets;

Product Outlets;

Outlets for produced goods now global;

Companies need to manage their own goods outlets;

Manufacturing facilities;

Manufacture where labour is cheap;

Avoid tariffs;

Reduce transport costs;

Trade boundaries;

Less limitations on trade boundaries;

Increased international trade agreements;

Communications;

Communications now rapid/use of internet;

Communications reliable;

Personnel mobility;

Rapid movement of people possible;

Easy to move internationally;

Market pull;

Consumers influenced by global communications;

May desire products not normally available to them;

[9 max]

Option F — Invention, innovation and design

- F1.** (a) *Award [1] for each distinct point in a description.*
it is an adaptation of a previously existing design/small change;
the pump is now in a new location;
more versatile bicycle seat; *[2]*
- (b) *Award [1] for the invention, and [2] for why it was important.*
synthetic rubber;
cheaper;
could be mass produced;

valves;
enabled pneumatics;
controlled air pressure;

pump;
required to get air into the tube;
required for owner to be able to replace leaked air;

jointing techniques;
rubber fusion to metal;
enabled in-built valves; *[3 max]*
- F2.** *Award [1] for each of two reasons.*
fear of theft of pump;
extra additional expense of pump above initial purchase;
pumps getting lost;
pump with the bike all the time;
improve bike aesthetics;
increased popularity of cycling; *[2 max]*
- F3.** *Award [1] for the point of comparison and [1] for a comment.*
influence;
LI less influential than the PC;

business acumen;
PC more than LI;

objectivity;
PC more than LI who is more emotionally involved;
LI may be more dogmatic and less flexible than PC;

Creativity;
LI creative in design;
PC creative in business;

Access to finance;
LI more likely than PC; *[2 max]*

F4. *Award [1] for naming the change and [1] for elaborating why.*
(Definition: robust design is flexible design which can be adapted to changing technical and market requirements.)

frame material;

changes due to lightweight materials available;

pump integration;

security concerns so pump is integrated in seat stem;

front wheel design;

spokeless for aerodynamic demands;

basic bicycle design changed to suit market segments;

BMX;

mountain bike;

manufacture:

can be manufactured as craft, mechanization or automation;

cost;

priced so affordable by most people;

ease of maintenance;

parts readily available;

easy to DIY repair;

[2 max]

F5. *Award [1] each for the statement of three advantages and [2] for a discussion of each advantage [6 max].*

choice;

broader range of products available;

products from many source countries available;

can choose over time/no hard sell by sales staff;

comparison shopping;

consumers can make wiser decisions;

no travel costs for making comparisons;

access 24/7;

no limits on shopping times;

more convenient for the consumer;

cheaper products;

global competition rather than local;

consumers can choose;

maybe no 'middle man' costs;

no travel costs for making purchase;

information;

more information enables comparisons;

can easily get technical information if required;

[9 max]

Option G — Health by design

- G1.** (a) *Award [1] for each criteria.*
surface should not encourage blood clots;
should be compliant / elastic;
maintain long term tensile strength;
must be biocompatible;
uniform volume production;
withstand repeated sterilization;
available in a variety of sizes; **[2 max]**
- (b) *Award [1] for a difference and [2] for explaining the difference.*
stability;
 weave is dimensionally stable;
 knitting is not dimensionally stable;

porosity;
 weave has low permeability;
 knitting is very porous;

flexibility;
 low for weave;
 high for knitting;

strength;
 weave has a high bursting strength / good fatigue resistance;
 knitting is less strong; **[3 max]**
- G2.** *Award [1] for the identification of a development and [1] for its description.*
Lowered rejection rates;
 incubation of cells on the prosthesis to avoid rejection;

computer modelling;
 computer models used to optimize design and simulate fabrication;

multi dimensional walls;
 thicker walls at the ends to make attachment easier; **[2 max]**
- G3.** *Award [1] for a reason and [1] an expansion of the reason.*
Impervious / porosity;
 Most metals are non-porous;

Biocompatibility;
 Most metals are biocompatible;

Ease of manufacture;
 Metals suitable for volume production; **[2 max]**

G4. Award **[1]** for each of two reasons.

higher incomes mean:

- access to better food;
- better quality housing;
- access to better quality healthcare;
- access to a better level of education about diseases and their prevention;
- more taxes paid so governments can spend more on healthcare;
- more media available (magazines, etc) so exposed to more information about health issues;
- lifestyle may leave more time for exercise; **[2 max]**

G5. Award **[1]** each for the identification of three reasons and **[2]** for each point in a discussion of each reason **[6 max]**.

enhanced productivity;

- staff more comfortable;
- more willing / able to produce more;

reduction in sick leave;

- more comfortable environment leads to less illness;
- reduces payment for sick leave;

reduction in staff turnover;

- staff more comfortable so more inclined to stay longer;
- lower recruitment costs;

comply with legislation;

- avoid non-compliance penalties;
- legislation covers different aspects of ergonomics;

moral obligation;

- employer should take into account employees needs;
- even if it costs more money;

[9 max]

Option H — Electronic products

H1. (a) *Award [1] for a statement of a use and [1] for a point in an outline.*

reacting to light;
closing curtains when the light gets bright;

turning lights off;
at sunrise, switching lights off;

any example where an action is taken by a motor as a result of increasing light conditions.

[2 max]

(b) *Award [1] for identifying the component as a diode and [2] for two points in an explanation.*

diode;
protects the relay;
allows electricity to flow in only one direction;

[3]

H2. *Award [1] for each point in a description.*

amplify a low/small input voltage;
can be inverting or non-inverting;
can compare two input voltages;

[2 max]

H3. *Award [1] for an indication in the diagram of closed loop and [1] for an indication of open loop.*

Diagram must indicate the following:

closed loop will have a complete circuit;
open loop will have opportunity for variable input at some place in the circuit;

[2]

H4. *Award [1] for each of two points in a description.*

many information signals can be sent along the same communication channel;
called multiplexing;

[2]

H5. Award [3] for three points in an explanation of each of the three areas.

power

power is not gained through contact;
card gets its power by induction;
embedded antenna enables power transfer;

reading and writing

does not require physical contact;
done through a reader or terminal-interface with a pc;
can be very simple or do complex processing;

memory

can either have a fixed memory which just stores data;
may have memory cells which are progressively used then the card is disposed;
cards may have a built-in logic;

[9 max]
