IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
PROGRAMA DEL DIPLOMA DEL BI

M07/4/DESTE/HP3/ENG/TZ0/XX/M+

MARKSCHEME

May 2007

DESIGN TECHNOLOGY

Higher Level

Paper 3

18 pages

If you do not have a copy of the current Design Technology Guide, please request one from IBCA.

Subject Details: Design Technology HL Paper 3 Markscheme

Mark Allocation

Candidates are required to answer **ALL** questions in each of **TWO** Options (total ***[20 marks]***). Maximum total = ***[40 marks]***.

General

A markscheme often has more specific points worthy of a mark than the total allows (especially for essay questions). This is intentional. Do not award more than the maximum marks allowed for part of a question.

When deciding upon alternative answers by candidates to those given in the markscheme, consider the following points:

- Each marking point has a separate line and the end is signified by means of a semicolon (;).
- An alternative answer or wording is indicated in the markscheme by a "/"; either wording can be accepted.
- Words in (…) in the markscheme are not necessary to gain the mark.
- Words that are <u>underlined</u> are essential for the mark.
- The order of points does not have to be as written (unless stated otherwise).
- If the candidate's answer has the same "meaning" or can be clearly interpreted as being the same as that in the mark scheme then award the mark.
- Mark positively. Give candidates credit for what they have achieved, and for what they have got correct, rather than penalising them for what they have not achieved or what they have got wrong.
- Remember that many candidates are writing in a second language; be forgiving of minor linguistic slips. Effective communication is more important than grammatical niceties.
- Occasionally, a part of a question may require a calculation whose answer is required for subsequent parts. If an error is made in the first part then it should be penalised. However, if the incorrect answer is used correctly in subsequent parts then **follow through** marks should be awarded. Indicate this with **"ECF"**, error carried forward.
- Units should always be given where appropriate. Omission of units should only be penalised once. Indicate this by **"U-1"** at the first point it occurs. Ignore this, if marks for units are already specified in the markscheme.
- Do not penalise candidates for errors in significant figures, unless it is specifically referred to in the markscheme.

Option D — Food Technology

D1. (a) *Award **[1]** for each of two points in a list of processes **[2 max]**.*
primary processing – wheat into flour;
secondary processing – flour into bread; ***[2 max]***

(b) *Award **[1]** for a statement of an organoleptic property, and **[1]** for a distinct point in an appropriate outline **[2 max]**.*
texture;
soft/hard;

taste;
sweet/savoury;

smell;
fresh;
mouthwatering;

appearance;
looks fresh;
attractive;
healthy; ***[2max]***

D2. *Award **[1]** for the identification of a macronutrient and **[1]** for the identification of a micronutrient **[2 max]**.*
micronutrient – vitamin A/calcium/iron/sodium;
macronutrient – fat/carbohydrate/protein; ***[2 max]***

D3. *Award **[1]** for the identification of information that should be included on a bread label and **[1]** for each point **[2 max]** in an explanation. **[3 max]** total.*

date;
retailer can rotate stock;
consumer will know how fresh the bread is;

storage and usage information;
consumer can keep it in appropriate conditions;
bread remains safe to eat;
appropriate temperature and humidity conditions;

warnings;
ingredients that may have side effects for some people;
for example gluten or nuts;

volume/mass;
consumer will know number of servings;
consumer will be able to do comparison shopping;

ingredients;
preservatives;
food additives;
materials; ***[3 max]***

D4. *Award **[1]** for listing each of two categories **[2 max]**.*

food borne infections;
food poisoning; ***[2 max]***

D5. *Award **[1]** each for the selection of three issues **[3 max]** and **[2]** for each distinct point in a discussion of each issue **[6 max]**. **[9 max]** in total.*

environmental issues; ***[3 max]***
effect of GM on other foods may not be clear;
effect of GM on the soil ;
effect of GM on native animals;

ethical issues; ***[3 max]***
the basic rights of people to know the contents of their food;
manipulating natural processes;
enhance efforts to solve food shortages;

legislation issues; ***[3 max]***
may be conflicting pressures for legislation;
conflicting pressures may include a food shortage vs. health concerns;
pressure from agriculture producers for more efficient products;

long term health issues; ***[3 max]***
the long tern effect on the health of people is undetermined;
it is only after a period of time that heath problems can be revealed;

labelling issues; ***[3 max]***
should GM foods be labeled;
what extent of GM in a food product warrants a label;
what information should be included in a label;

different countries have different levels of acceptance; ***[3 max]***
may depend on the countries level of development;
legislation is different in different countries;
different countries have different primary needs;

financial issues; ***[3 max]***
farmers may be locked into seed purchases;
maybe cheaper production because less pesticide/irrigation; ***[9 max]***

Option E — CAD, manufacture and production

E1. (a) *Award **[1]** for each point in a description **[2 max]**.*
cutting design is done on a computer CAD system;
CAD converted into programmed instructions;
programmed instructions are sent to the CAM cutting machine; ***[2 max]***

(b) *Award **[1]** for the identification of an advantage and **[1]** for each distinct point in a discussion of the advantage **[2 max]**.*
reprogrammability;
similar designs can be reproduced with little set up work;
no set up work required for repeat designs;

accurate cutting;
no human error involved in cutting;
minimize wastage;
multiple identical items;

high volume production;
machine can run 24x7;
more orders can be filled;

low manpower requirements;
only one person needed to run the machine;
machine can be left to complete processes unattended; ***[3max]***

E2. *Award **[1]** for the point of comparison (aspect) and **[1]** for an elaboration of that point **[2 max]**.*
skills;
workers would require a different set of skills;

production;
production would be more efficient with CNC;

quality;
CNC would provide more consistent quality;
quality assurance would be greater;

waste;
more accurate cutting:
amount of wastage could be minimized with CNC cutting;

time;
CNC cutting is faster. ***[2 max]***

E3. *Award **[1]** for each distinct point in a description **[2 max]**.*
CNC machine would enable fast production response when an order is placed;
CNC machine would provide a bank of designs to select from for production;
CNC machine is efficient and so would contribute to JIT efficiency; ***[2 max]***

E4. *Award **[1]** for each distinct point in a description **[2 max]**.*
high bandwidth;
because optical fibres are thinner than copper wire, more fibres can be bundled into a given diameter cable;
more data can be transmitted over the same size diameter cable, compared with copper;
the loss of signal in optical fibre is less than in copper wire;
light signals from one fibre do not interfere with those of other fibres in the same cable; ***[2 max]***

E5. *Award **[1]** for the identification of each advantage or disadvantage **[3 max]** and **[2]** for each distinct point in a discussion **[6 max]**.*
***[9 max]** in total.*

Advantages

imported expertise;
broadens the local expertise base;
flow on effect to the rest of the economy;

imported technologies;
technologies require repair and maintenance, therefore provide increased employment opportunities;
technologies may extend to other industries, thereby increasing the general technological base;

employment opportunities;
more jobs available so more employment opportunities;
more diverse range of skills required, so more opportunities;

economic advantage;
increased taxes to the local authorities;
flow on effect of the need for supply industries;
more salaried employees bring more income into the economy and so stimulates the economy;

market access;
locals have access to the products;
cheaper products available for locals;

Disadvantages

environment;
may be negative effects on the environment;
pollution increased;
industrializing the landscape;

culture;
migrant workers and technologies may negatively impact the local culture by weakening it;
culture of increased consumerism may change a local subsistence culture;

temporary location;
production units may not be permanent;
negative outcomes if the production unit moves to another country;
lead to unemployment;

work practices;
may introduce work practices not natural to the local culture;
24x7 shift work may be disruptive to local cultures; ***[9 max]***

Option F — Invention, innovation and design

F1. (a) *Award **[1]** for each distinct point **[2 max]**.*

lightweight camera;
convenient and immediate printing;
no use of chemicals;
no wasted prints;
instant viewing of pictures;
reasonable cost;
options of discarding, printing or saving;
appeal of new technology;
two products in one; ***[2 max]***

(b) *Award **[1]** for the identification of a reason, and **[1]** for each distinct point in the explanation of a reason **[2 max]**.*

very complex technology;
- unlikely that one person would have the breadth and depth of understanding;
- one person generally only skilled in a limited range of areas;

broad expertise required;
- invention would involve expertise from a range of areas;
- unlikely that one person would have all the expertise required;
- lone inventors usually work alone;

cost;
- very expensive research and development;
- more than one person could afford;

high risk;
- no guarantee of success;
- risk too great for an individual to take; ***[3 max]***

F2. *Award **[1]** for the identification of a benefit, and **[1]** for a point in the outline **[2 max]**.*

potentially large profits;
- potentially higher sales;
- able to sell initially at a higher price;

image;
- gain a perception as the market leader;
- gain image as an innovative/technology company;
- attract a higher skilled workforce;

competition;
- initially no other competition in the market; ***[2 max]***

F3. *Award **[1]** for the identification of a reason and **[1]** for a distinct point in describing the reason **[2 max]**.*

printing process;
- traditional process used a range of chemicals;
- inkjet process produces less chemical wastage and resulting damage;
- cartridges can be recycled/refilled;

energy;
- use less energy;
- good for the environment;

materials;
- traditional process uses more paper; ***[2 max]***

F4. *Award **[1]** for the definition of design family, and **[1]** for applying the definition to the camera printer **[2 max]***

definition:
- the evolution of a design into a variety of products that will appeal to a wide range of consumers;
- the camera printer represents a design family in the one product – printer, camera, charger, viewer, editor;
- *not all elements need to be mentioned for **[1]** mark* ***[2 max]***

F5. *Award **[1]** each for the identification of two reasons and one disadvantage **[1]** for each distinct point in an explanation. **[6 max] [9 max]** in total.*

Reasons for becoming popular: ***[6 max]***

choice;
- access to a wider range of products;
- within product lines, access to wider range of features;

product information;
- more sources of information are available;
- consumer decisions can be based on broader information;

sales pressure;
- no pressure from sales staff to make purchases;
- purchase decisions can be made when consumer is ready;

access;
- 24/7 access to ordering;
- convenience shopping can be done at any time;

price;
- products are often cheaper;
- there are less overhead costs for the seller to factor in the cost;

disadvantage: ***[3 max]***

return policy;
- it may be difficult to return faulty goods;
- the payment method may make it difficult to reclaim funds;

direct relationship;
- no direct relationship with the seller;
- maybe more difficult to discuss issues with the seller;

delivery;
- may be a time lag between ordering and delivery;
- limitation if product is urgently needed;

try before buy;
- not possible to handle or try object before buying;
- image only available on the web;

security;
- risk of identity theft;
- risk of credit card fraud; ***[9 max]***

Option G — Health by Design

G1. (a) *Award **[1]** for a definition.*
not harmful or toxic to living tissue and so able to be introduced into the human body;

[1 max]

(b) *Award **[1]** for a material.*
metals;
polymers;
ceramics;
glass;
accept appropriate specific materials from within these groups;

(c) *Award **[1]** for each distinct point in an appropriate explanation **[3 max]**.*
tested for biocompatibility;
tested in this specific application;
tested to ensure not harmful to living tissue;
tested for toxicity to human tissue; ***[3max]***

G2. *Award **[1]** for each distinct point in a description **[2 max]**.*
lenses can be thinner;
spectacles weigh less;
more comfortable for the user; ***[2 max]***

G3. *Award **[1]** for the identification of one way and **[1]** for an elaboration **[2 max]**.*
people for whom the chair was designed tested the chair;
tested for ease of operation;
tested for weight;
manoeuvrability;
ergonomics; ***[2 max]***

G4. *Award **[1]** for the identification of a reason and **[1]** for a description **[2 max]**.*

the money spent is recouped through later savings;
less expenditure on sick leave/new staff training;

productivity can be enhanced;
as workers can produce more efficiently;

less sick leave;
and so less down time;

lower staff turnover;
less recruiting and initial training costs; ***[2 max]***

G5. *Award **[1]** for the identification of each context **[3 max]** and **[1]** for each distinct point in an explanation of the benefits that could be derived **[6 max]**.*
***[9 max]** in total.*

public access buildings;
cost: expensive to make access changes after building is designed;
broader clientele to include disabled and therefore more sales;

street layout;
impossible to make changes after street layout is constructed;
disability access may be therefore prevented;
may be dangerous if disability issues not considered;

street furniture;
placement and style of furniture should consider disabled access;
maybe impossible to redesign after installation resulting limited access;

taxis;
if not all taxis are designed for disabled, wait times will be longer;
not all taxis would be able to respond to all calls;

accept other reasonable design contexts, similar to the above, in which the consideration of disability issues early in the design cycle provides benefits to the disabled ***[9 max]***

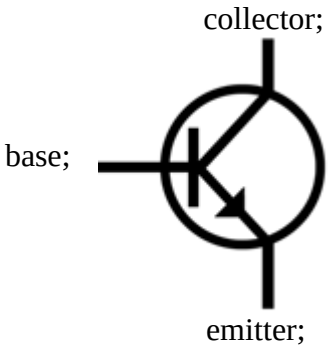
Option H — Electronic products

H1. (a) *Award **[1]** for the answer.*
12 volts; ***[1 max]***

(b) *Award **[1]** for each distinct point in an appropriate description **[2 max]**.*
transistor;
sending the signal to LED5;
regulates current flow; ***[2max]***

H2. *Award **[1]** for each distinct point in an explanation **[3 max]**.*
tank fills up with liquid;
liquid causes circuit to be connected;
current proceeds through resistor to LED;
when container is full, the buzzer circuit is activated and buzzer sounds; ***[3 max]***

H3. *Award **[1]** each for identifying the three components **[3 max]**.*



[3 max]

H4. *Award **[1]** for the identification of a benefit and **[1]** for a distinct point in an elaboration **[2 max].***
flexibility;
able to connect to a range of digital systems;

clarity;
digital signals are less effected by electrical noise;

speed;
rate of information transmission is greater;

range;
greater range of transmission; ***[2 max]***

H5. *Award **[1]** each for the identification of three products **[3 max]** and **[1]** for each distinct point in a discussion of the three products **[6 max]**. **[9 max]** in total.*

mobile phones;
- similar signal transmission to enable global roaming;
- able to be used in different networks;
- standards for dialing codes;

batteries;
- standard sizes;
- standard shape to fit into range of products;
- standard capacity;

CAD;
- drawing conventions standardized so conventions have same meaning;
- input and output devices compatible;

CD/DVD readers and writers;
- standardized codes for reading and writing so they can be used in different products;
- standard shape and size of discs;

wireless linked devices;
- standard transmission method;
- standard receiver/transmitter;

MP3 players;
- compatible music format;
- compatible download systems; ***[9 max]***