Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE 2008

MARKING SCHEME

TECHNOLOGY

HIGHER LEVEL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

TECHNOLOGY

Junior Certificate Examination, 2008
HIGHER LEVEL
200 Marks
Wednesday, 18th June, Afternoon, 2:00 to 4:00

SECTION A

INSTRUCTIONS

1. Answer Section A (short answer questions). 100 marks
2. Answer **either (a) or (b)** from **each** question in Section B. 50 marks
3. Answer **one** question from Section C. 50 marks
4. Hand up this paper at the end of the examination along with answer sheets for Section B and C.

Centre Number

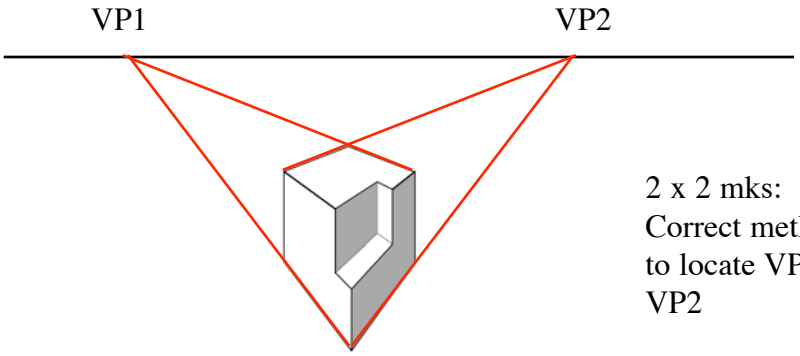
Examination Number

For Examiner	
Total Mark	
Question	**Mark**
Section A	
Section B Q1 (a)	
(b)	
Q2 (a)	
(b)	
Section C Q3	
Q4	
Q5	
Q6	
Total	
Grade	

MAKE SURE TO WRITE YOUR EXAMINATION NUMBER IN THE BOX PROVIDED ON THIS PAGE

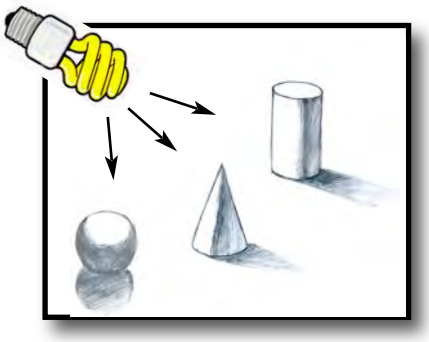
Section A Answer 25 questions from this section - all questions carry equal marks. 100 marks

1. Indicate clearly how to locate the vanishing points in the sketch shown.



2 x 2 mks: Correct method to locate VP1 & VP2

2. Identify **two** types of rendering used in the sketch shown.

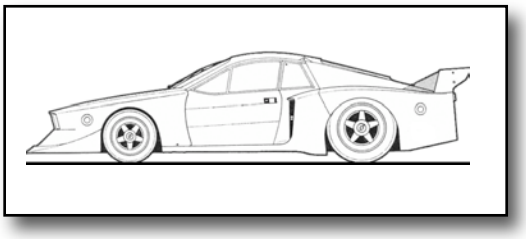


2 x 2 mks: Shadow, shading

(i): _____

(ii): _____

3. State **two** advantages of CAD for the production of a drawing.

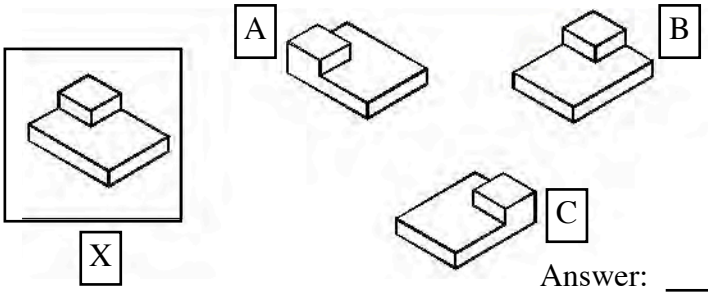


2 x 2 mks: Accuracy, easily changed, many copies, image stored, neater, etc.

(i): _____

(ii): _____

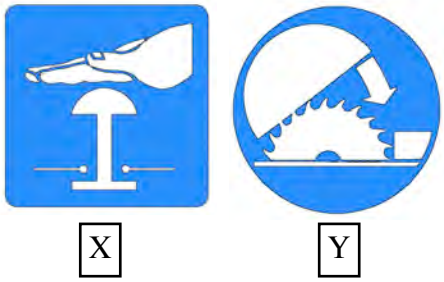
4. Which one of the views A, B or C is a rotated view of image X?



4 mks: C

Answer: _____

5. State the meaning of each of the symbols shown.

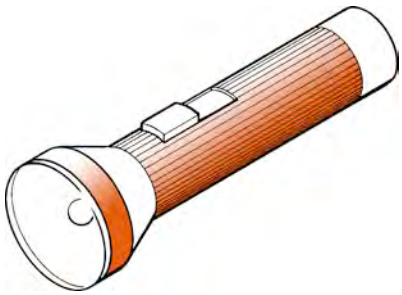


2 x 2 mks:

X: Emergency stop(button)

Y: Keep guard/cover on saw

6. Name **two** energy conversions which take place when the battery operated torch shown is switched on.



4 x 1 mks:

From: Chemical

To: light / heat / electrical

From: Electrical

To: light / heat

7. State **two** precautions which should be taken to prevent acrylic sheet shattering when drilling a hole in the sheet.

2 x 2 mks:
Drill pilot hole,
Clamp acrylic to wood,
Drill speed.

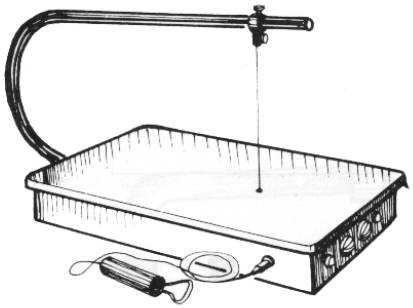
(i): _____

(ii): _____

8. Identify the equipment shown

and

identify the material shaped by this equipment.



2 x 2 mks:

Equipment: Hot wire

Material: PolyStyrene, aeroboard, aerofoam, foam.

9. State one advantage

and

one disadvantage of using the type of drill shown.

2 x 2 mks:

Advantage: Portable, no wires

Disadvantage: Short battery life

10. Identify the two types of saw shown at 'X' and at 'Y'.

X 

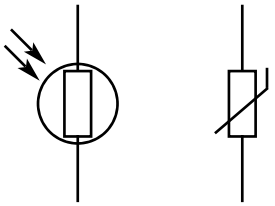
Y 

2 x 2 mks:

X: Coping Saw

Y: Hack Saw

11. Name the electronic components which are represented by the symbols shown.



X Y

2 x 2 mks:

X: LDR (ORP12)

Y: Themistor

12. Identify the logic gate which will produce the truth table shown.

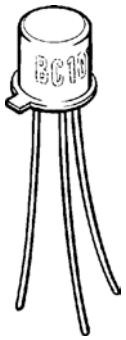
Truth Table

Input1	Input 2	Output
1	1	***0***
1	0	***1***
0	1	***1***
0	0	***1***

4 mks: NAND / NOTAND

Logic Gate: _____

13. State the **two** functions which a transistor can have in a circuit.



2 x 2 mks:
Amplifier
Switch

(i): _____

(ii): _____

14. State **two** functions of a multimeter, similar to that shown.

2 x 2 mks:
to measure - resistance, current, voltage(PD), capacitance, continuity, transistor gain, etc.

(i): _____

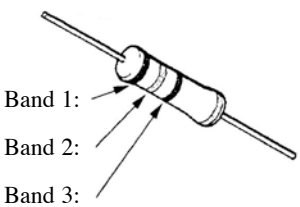
(ii): _____

15. Using the table shown, state the colour of the third band in each of the following resistors:

(a) 10k,

(b) 300Ω.

Colour	Value
Black	*0*
Brown	*1*
Red	*2*
Orange	*3*
Yellow	*4*
Green	*5*
Blue	*6*
Violet	*7*
Grey	*8*
White	*9*



2 x 2 mks:

Answer:

(a) : orange

(b) : brown

16. The sketch shows a land yacht. Name the main force acting on the non-rigid stay 'X'

and

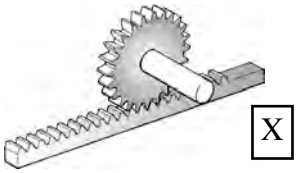
name a suitable lightweight material for the body of the yacht.

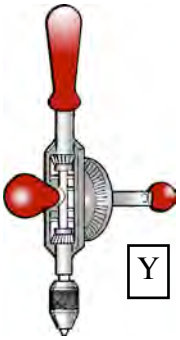
2 x 2 mks:

Force: tension

Material: Aluminium, fibreglass, plywood, carbon fibre, polycarbonate, etc.

17. Identify the mechanisms shown at 'X' and at 'Y'.



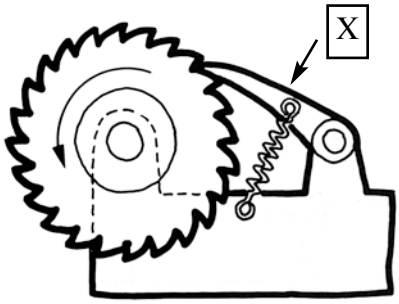


2 x 2 mks:

X: rack (1) & pinion (1) gears

Y: bevel gears

18. Name the part marked 'X' and state its function.



2 x 2 mks:

Name: pawl

Function: prevent slippage (of ratchet)

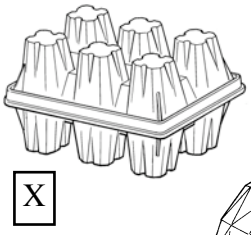
19. State **two** reasons why a belt system might be used in a mechanism in place of a chain system.

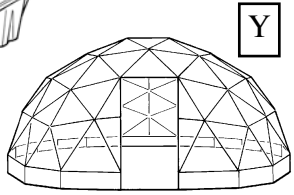
2 x 2 mks:
easier to fit (remove),
allows slippage, low cost, etc.

(i):

(ii):

20. Identify the two types of structure used in the eggbox at 'X' and in the dome at 'Y'.





2 x 2 mks:

X: shell (structure)

Y: frame (structure)

21. State **two** reasons why plastic bottles should be recycled.

2 x 2 mks:
oil limited resource, cost,
environmentally friendly,
reduce use of raw material (oil)
etc.

(i): _____

_____

(ii): _____

_____

22. Identify **two** data storage devices which can be used with a computer.

2 x 2 mks:
CD, DVD, USB (stick), HD,
flash (pen) drives.

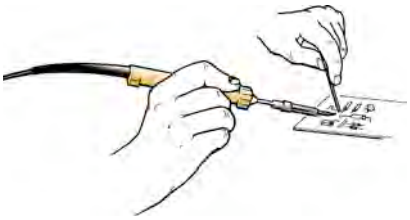
(i): _____

_____

(ii): _____

_____

23. State **two** safety precautions which must be observed when using a soldering iron.



2 x 2 mks:
Ventillation, glasses,
stand for hot iron,
keep (hot) tip away from lead,
don't overheat component, etc.

(i): _____

_____

(ii): _____

_____

24. Name the modern **inventor** responsible for the invention of the bagless vacuum cleaner,

and

name an **invention** credited to Alexander Graham Bell.

2 x 2 mks:

Inventor: Dyson

_____

_____

Invention: Telephone

_____

_____

25. State **one** safety feature that should be incorporated into the toy Ferris wheel design shown.

4 mks: 1 safety feature
No sharp edges,
mechanism safely housed,
parts secured, etc.

(i): _____

_____

(ii): _____

_____

26. List **two** properties found in man-made fabrics not found in natural fabrics.

2 x 2 mks:
fade resistance colours, lightweight, drip dry, crease resistant, etc

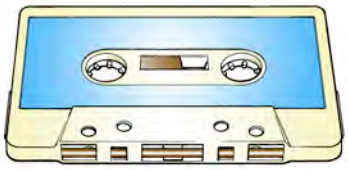
(i): _____

_____

(ii): _____

_____

27. State **two** reasons why audio cassettes are no longer widely used for music recordings.



2 x 2 mks:
cassettes are of lower (audio) quality, faster access to tracks on CD, tape stretches / easily damaged, etc.

(i): _____

_____

(ii): _____

_____

28. Describe **two** ways in which technology has extended the shelf life of food products.

2 x 2 mks:
food irradiation, chemical treatment of food, vacuum packing, freeze dry, etc.

(i): _____

_____

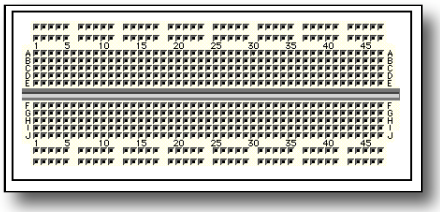
(ii): _____

_____

29. Identify the object shown

and

state clearly why it is used.



2 x 2 mks:

Object: (Solderless) Breadboard

_____

Use: set up a temporary circuit

_____

_____

30. State **one** reason why it was necessary to develop new materials in order to manufacture the space shuttle.

4 mks:
Extreme conditions (high & low temp.) require new materials,

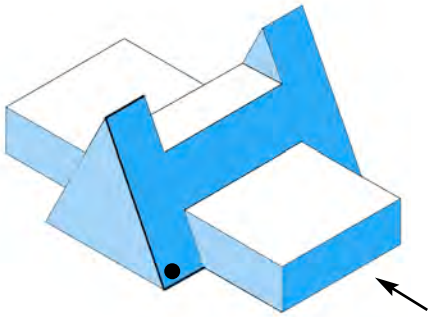
Reason: _____

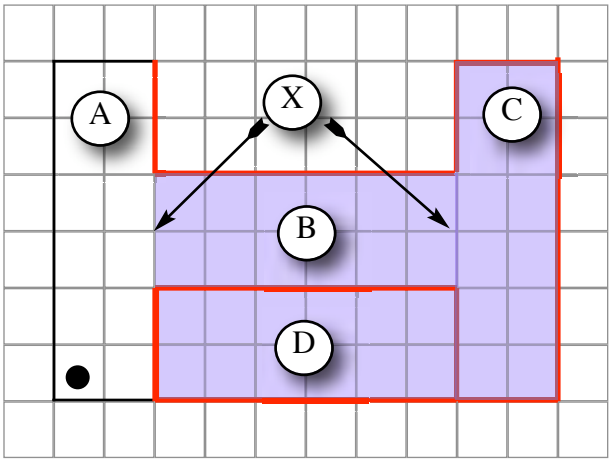
_____

_____

_____

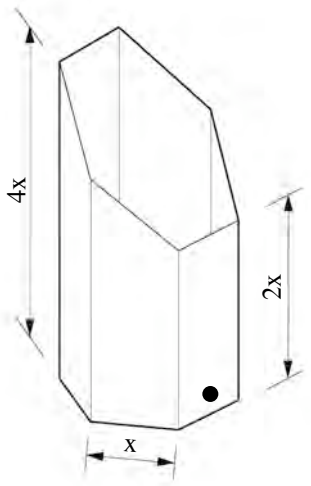
31. Complete the end view of the part shown.

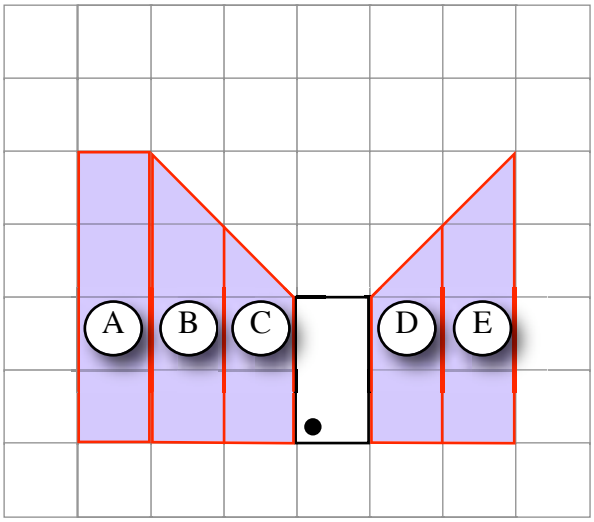




4 mks: 4 panels correct 4 x 1 mk.
-1 mk if solid lines shown at 'X'

32. Complete the development of the sides of the regular hexagonal based desk tidy shown.





4 mks: any 4 correct faces shown (A - E)
in correct location 4 x 1 mk.

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HIGHER LEVEL

200 Marks

Wednesday, 18th June, Afternoon, 2:00 to 4:00

SECTION B and SECTION C

SECTION B - 50 Marks

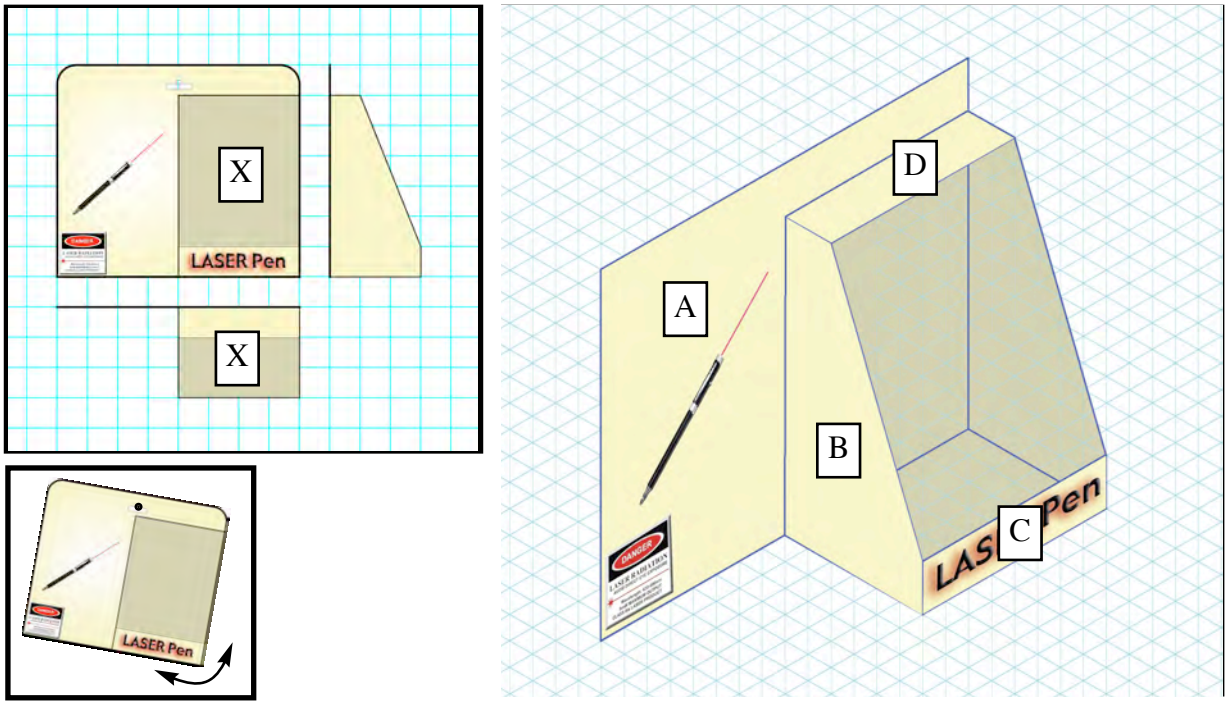
SECTION C - 50 Marks

INSTRUCTIONS

1. Answer **either (a) or (b)** from **each** question in Section B.
2. Answer **one** question from Section C.
3. Make sure to **hand up Section A** with your answer sheets to this paper.

SECTION B - 50 Marks **Question 1, answer either (a) or (b) from this question.**

1 (a) The sketch shows a student design, in plan, elevation and end view, for a laser pen display pack. The pack is manufactured from paper board and holds 12 laser pens.



(i) Sketch a well proportioned isometric view of the display pack on isometric grid paper.

Correct isometric view : 2 mks,
4 panels in good proportions 4 x 2 mark *10 marks*

(ii) 1. Sketch a design for a paper board tray, at 'X', to hold 12 laser pens upright in the display pack.

Valid solution : 3 mks (3,1), Quality of sketch : 2 mks

2. State **two** reasons why paper board is a suitable material for the manufacture of display packs.

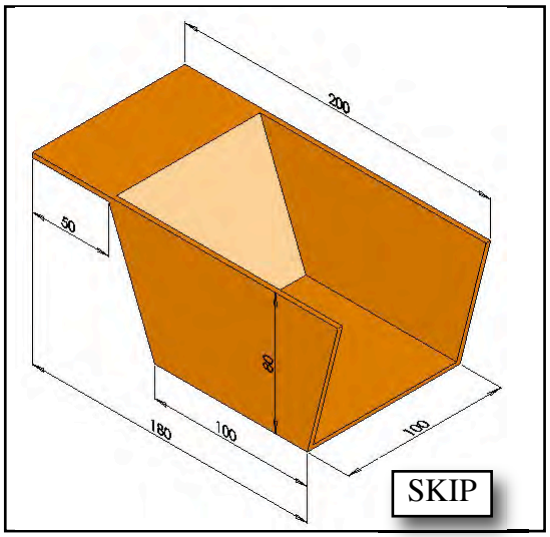
1st valid reason : 3 mks, 2nd valid reason : 2 mks
(Ease of manufacture, low cost, paper recycled, etc.) *10 marks*

(iii) When hung at the attachment point, the display pack swung away from the vertical. Using a sketch, show how this design fault could be corrected.

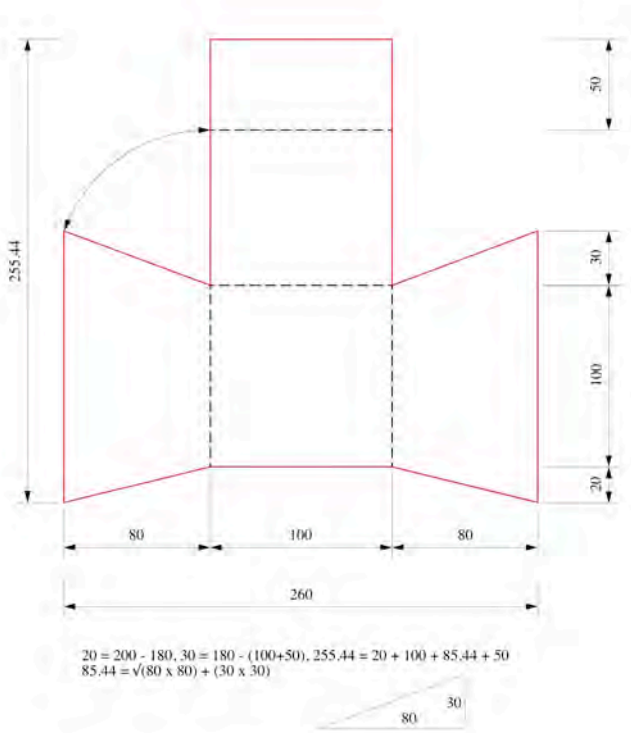
Valid solution : 3 mks (3,1), Quality of sketch : 2 mks *5 marks*

- OR -

1 (b) The sketch shows a student design for a toy tipper truck, with a skip.
The skip will be manufactured from acrylic.



All dimensions are in millimeters



(i) Using a suitable scale, sketch a development of the material required to manufacture the skip from a single sheet of acrylic.
Indicate clearly all bend lines and show the overall dimensions.

5 Panels correct : 5 x 1mks, Dotted bend line : 1 mk,
Overall dimensions : 2 x 2 mks [260 & 255.44] *10 marks*

(ii) 1. Name and sketch a suitable method of attaching a swing door to the rear of the skip.

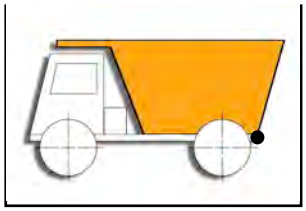
Suitable method : 3 mks, Quality of sketch : 2 mks

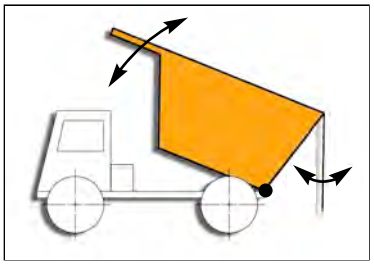
2. Name and sketch a suitable mechanism to raise and lower the skip on the truck.

Named mechanism : 1 mk, Suitable method : 2 mks, Quality of sketch : 2 mks
10 marks

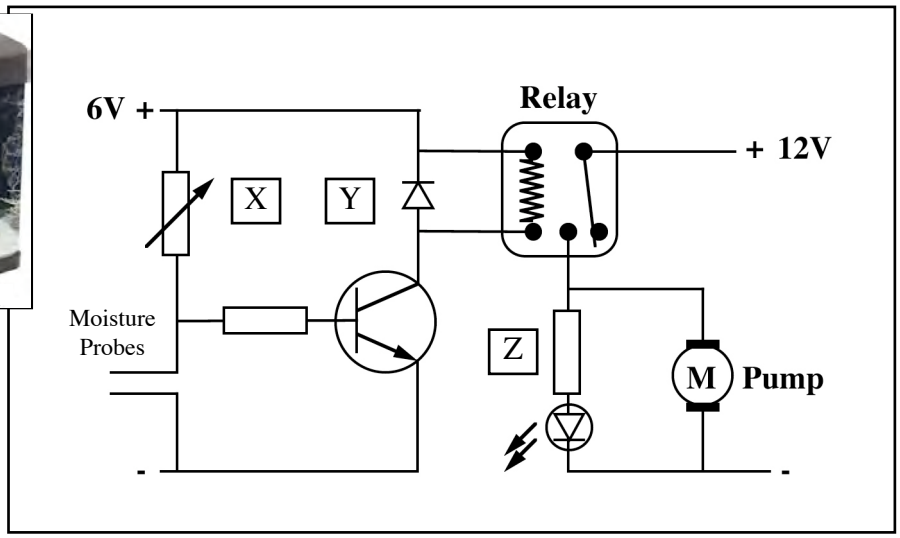
(iii) Sketch **two** safety features which should be included in this student design.

1*st valid safety feature sketched : 3 mks, 2nd valid safety feature sketched : 2 mks*
5 marks





2 (a) The circuit shown is designed to turn on a water pump if low water levels are detected in a fish tank.



(i) 1. Identify the component labelled 'X' and state the function of this component in the circuit.

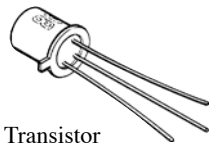
X = Var. resistor : 3 mks, Correct function : 2 mks

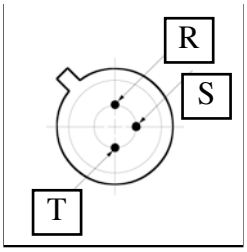
2. Explain how the circuit would function if component 'X' and the moisture probes were interchanged in the circuit.

Correct explanation : 5 mks (detect wet / high water level, etc.)

3. Identify the component labelled 'Y' in the circuit.

Y = Diode : 3 mks


Transistor



(ii) 1. Which one of the pins labelled 'R', 'S' or 'T' is the emitter of the transistor shown?

Emitter = R : 2 mks

2. Name the type of relay shown in the circuit above and explain why a relay is required in the circuit.

Type of Relay = SPDT : 2 mks, Why required : 3 mks
(Control larger voltage, act as switch, protect sensor circuit, etc.)

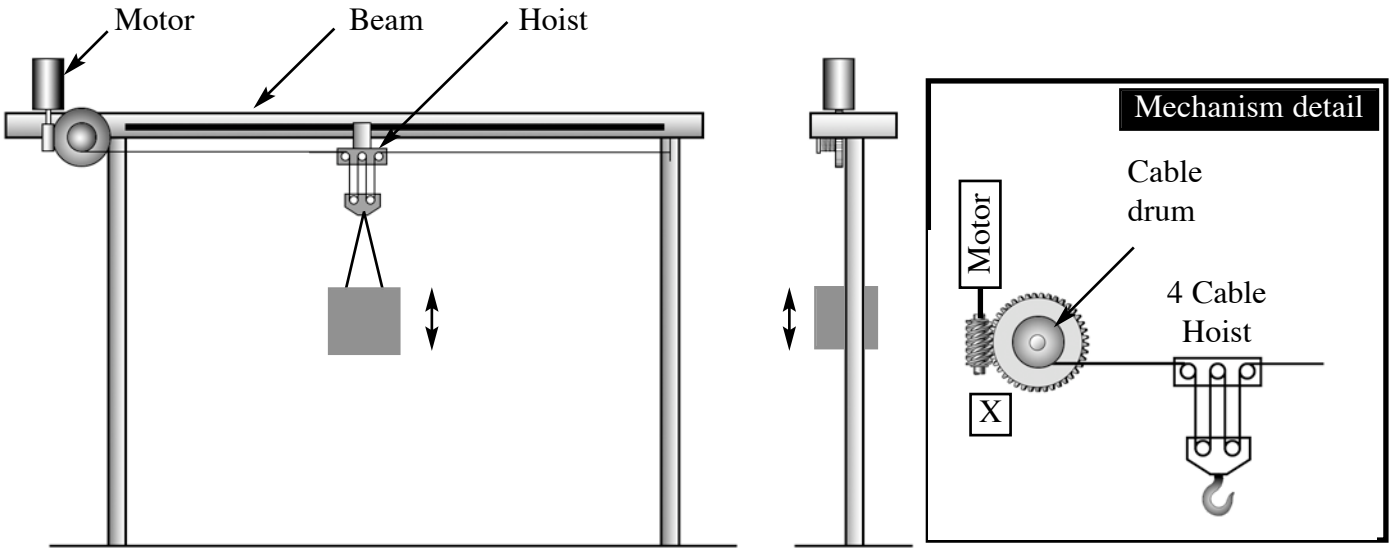
3. Calculate the required value for resistor 'Z' from the following LED data: LED V_f = 2V and LED I_{max} = 20mA.

500Ω : 5 mks (Alt: V÷I = R : 2 mks, (12-2)[1 mk]÷0.02[1 mk])

25 marks

- OR -

2 (b) The sketch shows a student design for a motorised hoist on a gantry crane.



Front Elevation of Gantry Crane Side Elevation

(i) 1. Name the mechanism attached to the motor at 'X'.

X = Worm (Gear) : 3 mks

2. State **two** advantages to the mechanism at 'X' over a compound gear system.

1st correct advantage : 3 mks, 2nd correct advantage : 3 mks
(No slip, large gear reduction, speed, torque, space, etc.)

3. State **two** advantages of using the **four cable** hoist, as shown above.

1st correct advantage : 3 mks, 2nd correct advantage : 3 mks
(Load shared over 4 cables, Force required by motor less, MA, etc.)

15 marks

(ii) Sketch a mechanism which will move the hoist along the beam.

Satisfactory mechanism : 3 mks, Quality of sketch 2 mks
(motorised rack & pinion system, motorised pulley system, etc)

5 marks

(iii) The gantry crane structure shown above is unstable.

Sketch **two** structural features which will increase the stability of the crane.

1st correct structural feature sketched : 3 mks,
2nd correct structural feature sketched : 2 mks
(Struts or ties in front and side elevations) *5 marks*

Section C - 50 Marks

Answer **one** question from this section - all questions carry equal marks.

This section relates to **Technology & Society, Control Systems** and **Design & Manufacture**.

3. Technology and Society

The design of modern mobile phones has changed dramatically since they were first introduced.

(a) (i) Describe **one** technological advance which made these design changes possible.

1 Advance : 5 mks (New chip design, battery size, screen resolution, touch screen, etc)

(ii) Describe **one** additional function available only in modern mobile phones.

1 Additional function described : 5 mks (Web access, play movies/songs, camera, etc.)
10 marks

The technologies of GPS, GSM, Sat Nav, DVD, MP3 and USB are in common use.

(b) (i) Explain the meaning of any **two** of these technological terms.

2 terms meaning explained : 2 x 5 mks
[term expanded : 2 mks, quality of explanation : 3,2,1 mks]
Global Positioning System, Global System for Mobile communications, Satellite Navigation, Digital Versatile(Video) Disc, MPEG-1 Audio Layer 3, Universal Serial Bus.

(ii) For each of the **two** selected terms, outline the advantages of these new technologies.

1 valid advantage 1st selected technology : 5 mks (5,3,1 quality of ans.)
1 valid advantage 2nd selected technology : 5 mks (5,3,1 quality of ans.) 20 marks

Scientists have warned that fossil fuels are a dwindling resource.

(c) Outline **two** other problems associated with the continued use of fossil fuels.

2 problems outined : 2 x 5 (5,3,1)mks (Pollution, financial, derived products, etc)10 marks

(d) Outline the alternative fuel sources which could be used to provide for the following:

(i) public and private transport,

Alternative outlined : 5 mks (5,3,1 quality of ans.) (Electric, biofuel, fuel cell, etc.)

(ii) electrical supply to industry and homes.

Alternative outlined : 5 mks (5,3,1 quality of ans.) (Nuclear, hydro, wind, etc.)
10 marks

4. Control Systems & Technology and Society

Robots are commonly used in industry and in planetary exploration.

(a) (i) Explain **where** and **why** robots are used in industry.

Where : 5 mks (5,3,1 quality of ans.) (Production line, spray painting, AGV, etc.)
Why : 5 mks (5,3,1 quality of ans.) (Safety, Accuracy, productivity, endurance, etc.)

(ii) Explain how the actions of industrial robots are **controlled** and **modified**.

Controlled : 5 mks (5,3,1 quality of ans.) (Computer, programme, remote control)
Modified : 5 mks (5,3,1 quality of ans.) (Re-write programme, etc.)

(iii) Outline **two** differences between robots used in industry and in planetary exploration.

2 x valid differences : 2 x 5 mks (5,3,1 quality of ans.)
(Power source, level of autonomy, etc.)

(iv) Outline **two** other applications of robotics.

2 x valid applications : 2 x 5 mks (5,3,1 quality of ans.)
(Bomb disposal, undersea exploration, AGV's, toys, domestic, military, etc)

40 marks

Manufacturing jobs in Ireland are frequently lost to developing countries.

(b) (i) Explain why jobs are being transferred to other countries.

1 x explanation : 5 mks (5,3,1 quality of ans.)
(lower production cost overseas, labour cost high, transport cost high, etc.)

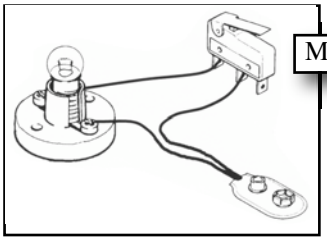
(ii) Outline the type of skills required by the Irish workforce to maintain employment in Ireland.

1 x valid skill type : 5 mks (5,3,1 quality of ans.)
(R & D, product design and development, skills requiring a high educational qualification, etc.)

10 marks

5. Design and Manufacture

A student is required to manufacture a model lighthouse with a flashing light based on the design shown.



(a) Describe, with the aid of suitable sketches, the steps required to manufacture the main lighthouse structure from a suitable material.
Name **three** tools and processes required to manufacture the lighthouse structure.

Suitable steps to manufacture - sketched : 5 mks
Quality of sketches : 5 mks
3 appropriate tools & processes : (4 + 3 + 3) mks

20 marks

(b) (i) Describe, with the aid of suitable sketches, a motorised mechanical system to activate the flashing light by opening and closing the microswitch.

Valid motorised mechanical system sketched : 5 mks (Motor & CAM, etc.)
Quality of sketch : 5 mks (5,3,1 quality of ans.)

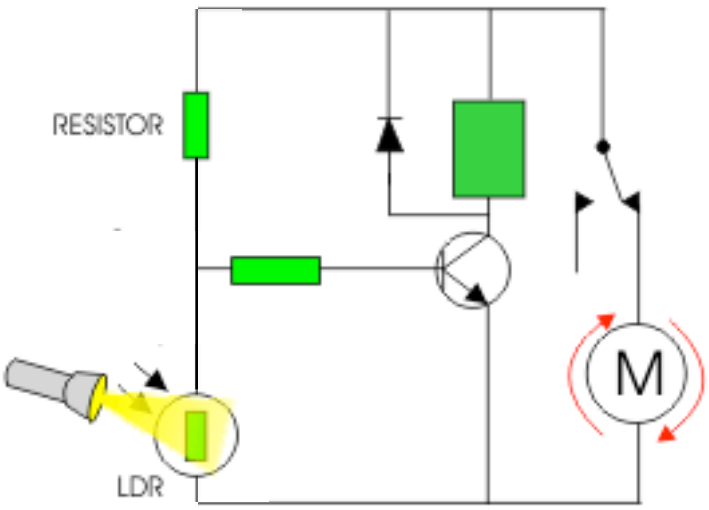
(ii) Explain how this mechanical system could be modified to change the number of light flashes per minute.

Valid modifiction sketched : 5 mks (modified CAM, modified gear system, etc.)
Quality of sketch : 5 mks (5,3,1 quality of ans.)

(iii) Describe, with the aid of suitable sketches, how this motorised mechanical system could be activated automatically at nightfall.

Valid circuit diagram sketched : 5 mks (LDR & transistor)
Correct symbols / Valid description : 5 mks

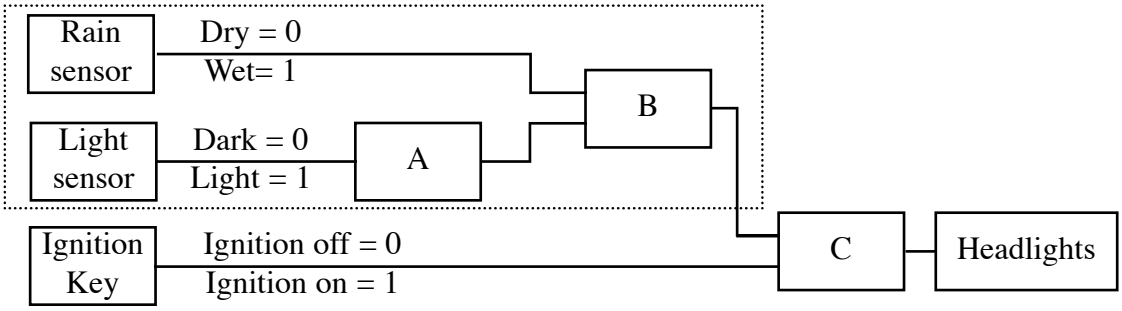
30 marks



6. Control Systems

A block diagram for a motor car safety system is shown.

The system will automatically switch on the car headlights when it is dark or when it rains. The system will operate only when the ignition key is turned on.



(a) (i) Identify the logic gates required at A, B and C.

A = NOT gate : 4 mks
B = OR gate : 4 mks
C = AND gate : 4 mks

(ii) Sketch and complete a truth table for logic gates A and C.

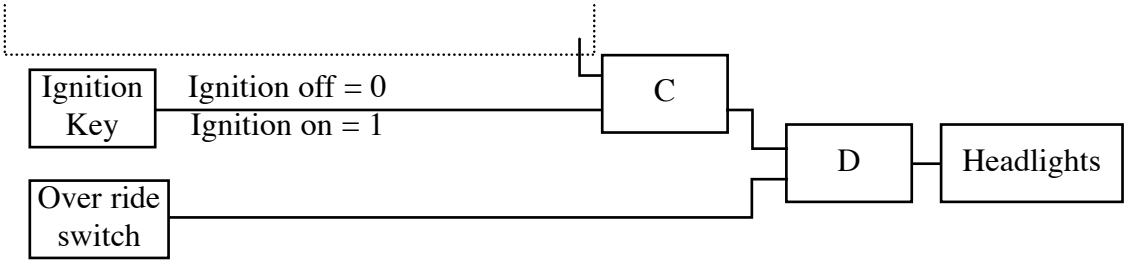
NOT gate truth table : 2 x 2 mks

1	0
0	1

AND gate truth table : 4 x 2 mks

1	1	1
1	0	0
0	1	0
0	0	0

(iii) The block diagram below shows a modification to this system to allow the driver switch on the lights when required.

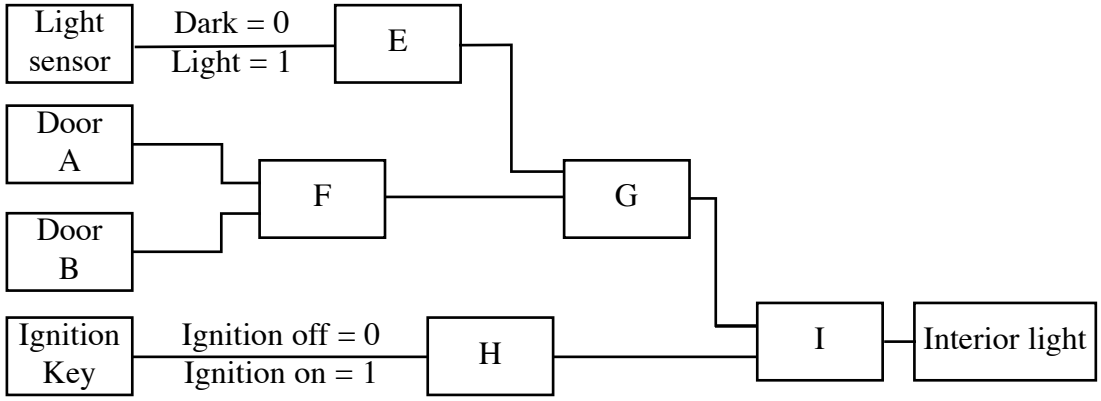


(iv) Name the gate required at 'D' and explain why the system will work with the selected gate.

D = OR gate : 4 mks
Explain why work : 2 mks

30 marks

(b) A second system is required to turn on the interior light at night, if either the driver door or the passenger door is opened. The interior light must turn off if the ignition key is turned on.



Name the gates required at E, F, G, H and I for this system.

E = NOT gate : 4 mks
F = OR gate : 4 mks
G = AND gate : 4 mks
H = NOT gate : 4 mks
I = AND gate : 4 mks

20 marks