Engineering Questions by Topic

Higher Level

Question 1

Section A

Short Questions

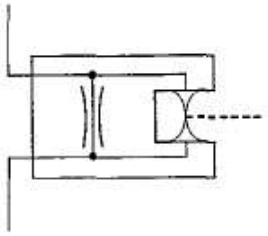
50 Marks

1996 Question 1 Section A

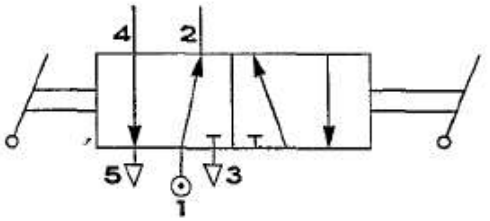
Give brief answers to any ten of the following:

(a) What health hazards are associated with the use of cutting fluids?
(b) Differentiate between hydrometallurgy and pyrometallurgy.
(c) Explain the difference between a substitutional and interstitial solid solution.
(d) Name processes used to manufacture **(i)** uPVC window frames; **(ii)** automobile distributor caps and **(iii)** ball pein hammers.
(e) State **two** factors that affect the fatique properties of a material.
(f) Explain the difference between **(i)** primary bonding and **(ii)** secondary bonding in polymers.
(g) In relation to the prevention of corrosion, explain what is meant by sacrificial protection.
(h) Explain the type of bonding which occurs in **(i)** polymers and **(ii)** metals.
(i) State **two** advantages of adhesives relating to the joining of engineering materials.
(j) Differentiate between **(i)** a line defect and **(ii)** a point defect in a crystal structure.
(k) In relation to computers distinguish between parallel and serial transmission.
(l) Identify the pneumatic symbols **(i)** and **(ii)** shown.

(i)



(ii)



(m) Indicate the contribution of any **one** of the following to technology:

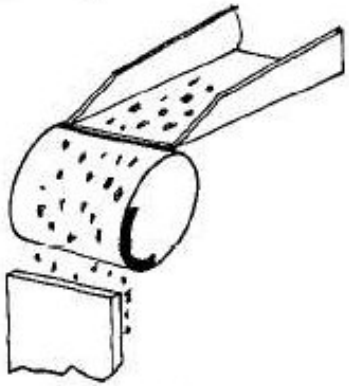
(i) Dugald Clerck or
(ii) Louis Bonneville or
(iii) Eli Whitney.

1997 Question 1 Section A

Give brief answers to any ten of the following:

(a) Explain the systemic effects of toxic materials.

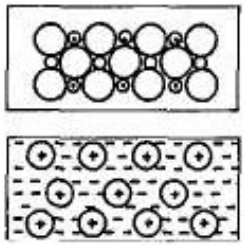
(b) Describe the method of ore dressing in the sketch shown.



(c) What causes creep in metals?

(d) What is meant by Factor of Safety?

(e) Distinguish between the two types of bond structures shown.

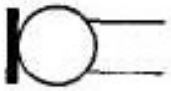
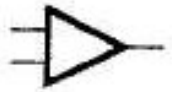


(f) Explain the term Cathodic Protection.

(g) Name the processes used to manufacture:

(i) Electrical wire **(ii)** Connecting rods **(iii)** Acrylic sheet.

1997 Question 1 Section A cont.

(h) Identify the electronic symbols: (i)  (ii) 

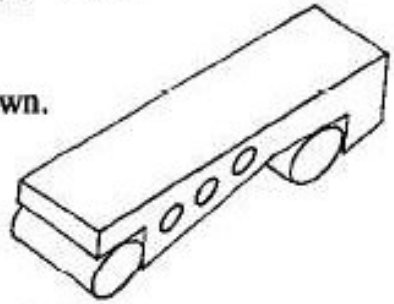
(i) State **two** disadvantages in using an adhesive for joining.

(j) Name **three** methods employed in the disposal of waste plastics.

(k) Select **any three** abbreviations and explain their meaning.

(i) PLC (ii) ALU (iii) PTFE (iv) ROM (v) CPU

(l) Name and describe the function of the device shown.



(m) Outline a contribution to technology by **one** of the following:

(i) Victor Popp (ii) Germaine Sommeiller (iii) Blaise Pascal.

1998 Question 1 Section A

Give brief answers to any ten of the following:

(a) Describe the toxic hazards associated with:

(i) adhesives and

(ii) cutting fluids.

(b) Distinguish between Pyrometallurgy and Hydrometallurgy.

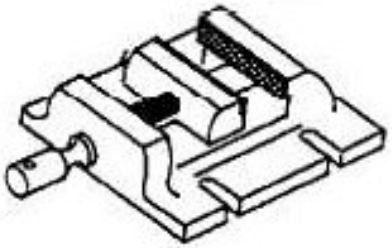
(c) Give an example of any quality control used in industry.

(d) State the process used to manufacture any two of the following:

(i)

(ii)

(iii)

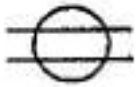


(e) What is age hardening?

(f) Describe electrical conduction in the metallic bond.

1998 Question 1 Section A cont.

(g) Identify <u>any two</u> of the weld symbols:

(i)  (ii)  (iii) 

(h) Distinguish between electronic circuit construction using breadboard or veroboard.

(i) What is sacrificial protection of metals?

(j) What is meant by metal *fatigue*?

(k) Distinguish between crystalline and amorphous polymers.

(l) Explain <u>any two</u> of the computer terms below:

(i) address (ii) peripheral units (iii) digitizer.

(m) Suggest an inventor associated with the development of one of the following:

(i) wind tunnel (ii) computer (iii) transistor.

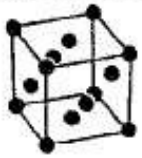
1999 Question 1 Section A

Give brief answers to any ten of the following:

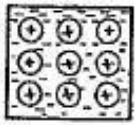
(a) Describe how **any one** electrical hazard may be prevented.

(b) Name **one** physical property of metals which can be used to facilitate ore dressing.

(c) Explain why slippage occurs more easily in FCC structures.



(d) A metallic bond is shown, outline briefly its main properties.



(e) State **two** ways of ensuring good quality joints when using adhesives.

(f) Select **any three** of the abbreviations shown and explain their meaning:

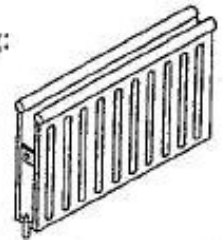
(i) IC; **(ii)** PTFE; **(iii)** RAM; **(iv)** LCD; **(v)** VDU.

(g) State the main process used to manufacture **any two** of the following:

(i)

(ii)

(iii)

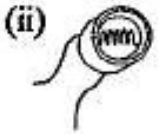


1999 Question 1 Section A cont.

(h) Two electronic devices are shown, identify **only one** and describe its purpose.

(i)

(ii)



(i) Outline **three** main ways of preventing corrosion in metals.

(j) Suggest **any two** applications of the dial gauge shown.

(k) How does hardening occur in the aluminium Y-alloy?

(l) Outline the purpose of the gauge shown opposite.

(m) Describe a contribution to technology by **any one** of the following:

(i) Joseph Henry; **(ii)** Michael Faraday; **(iii)** Ivan Sikorsky.

2000 Question 1 Section A

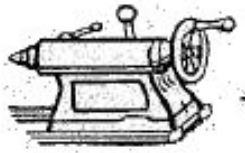
Give brief answers to any ten of the following:

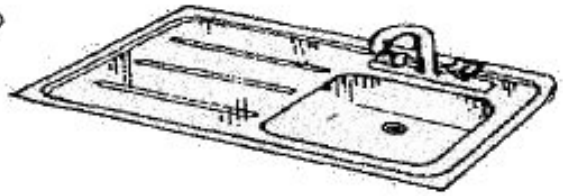
(a) Describe the purpose of **any one** of the labels shown:

(b) Differentiate between pyrometallurgy and hydrometallurgy.

(c) Identify and explain **any one** common type of lattice defect in metals.

(d) Describe the basic principles used to manufacture **any one** of the items opposite.

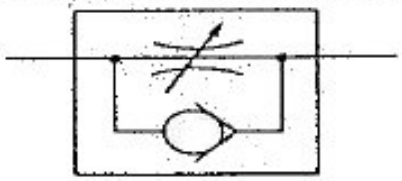




(e) State **two** ways of minimising corrosion in metals.

(f) What factors should be considered when joining materials using adhesives?

(g) Identify the pneumatic symbol shown:



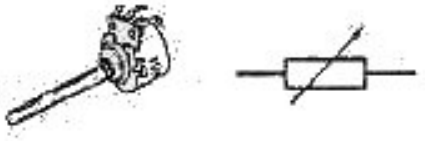
2000 Question 1 Section A cont.

(h) Name **any three** methods employed in the disposal of waste plastics.

(i) What is meant by the term *metal fatique*?

(j) Two electronic components are shown as pictorial sketches and in symbolic form. Name **one** component and outline its purpose.

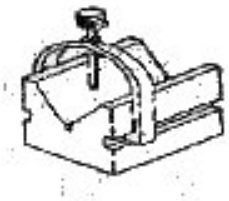
(i)



(ii)

(k) Explain **one** of the following computer terms:
(i) Random access memory (RAM); (ii) Central processing unit (CPU);
(iii) Read only memory (ROM).

(l) Outline a function of the Vee block shown.



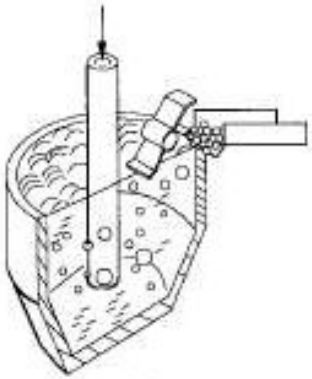
(m) What contribution did **any one** of the following make to technology:
(i)Blaise Pascal; (ii) Dugald Clerk; (iii) Leo Baekeland.

2001 Question 1 Section A

Give <u>brief answers</u> to <u>any ten</u> of the following.

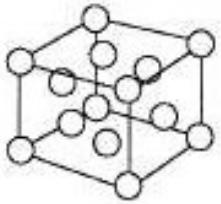
(a) What safety precautions should be observed when using cutting fluids?

(b) Describe the flotation separation method shown opposite.

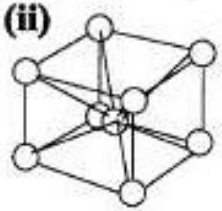


(c) Identify in which cubic crystal form shown at (i) and (ii) is slippage more likely to occur and state why this is the case.

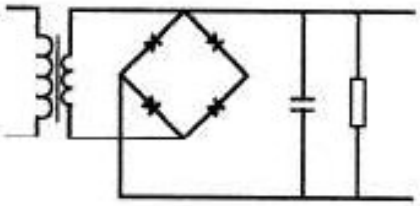
(i)



(ii)



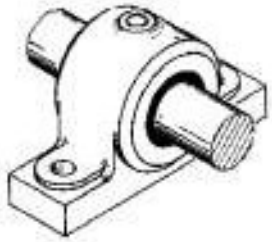
(d) Identify and outline the function of either the transformer <u>or</u> rectifier shown in the circuit diagram.



(e) Name <u>any three</u> essential differences between metals and non-metals.

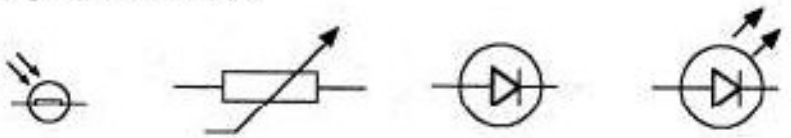
2001 Question 1 Section A cont.

(f) Identify the main processes used to manufacture **any one** of the items shown.



(g) Explain the term *elastic memory* with reference to thermoplastics.

(h) Name **any three** of the electronic symbols shown and briefly outline their function.



(i) Explain the term *creep* with reference to metals.

(j) What environmental factors hasten the corrosion rate of metals?

(k) Briefly describe **any two** common defects in metal crystals.

(l) Outline the advantages of compressed air over other forms of power supply.

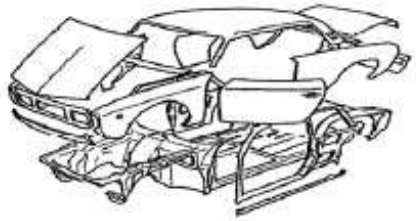
(m) What contribution did **any one** of the following make to technology?
(i) Gottlieb Daimler; (ii) Daniel Bernoulli; (iii) Robert Boyle.

2002 Question 1 Section A

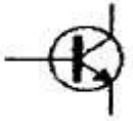
Give brief answers to any ten of the following.

(a) Describe **any one** defect in metal crystals.

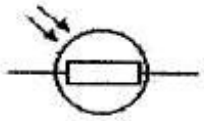
(b) Outline **any three** main processes used in the manufacture of the motor vehicle shown.



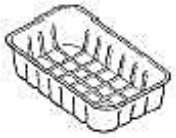
(c) Identify and state the purpose of **any one** of the electronic components shown.


(i)


(ii)


(iii)

(d) Name a suitable manufacturing process for **one** of the plastic items below.



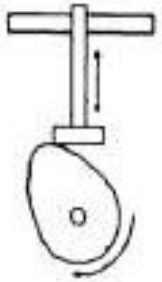
(e) What is dendritic growth?

(f) Explain the term allotropic.

(g) Describe the metallic bond and how the structure affects the properties of metals.

2002 Question 1 Section A cont.

(h) Outline the function of the mechanism shown opposite.



(i) Why are non-metals important in electronics?

(j) Describe the purpose of **any one** safety symbol shown.

(k) Describe how the dovetail shown opposite is checked for dimensional accuracy.

(l) What contribution did **any one** of the following make to technology:
(i) Theodore Maiman, (ii) Charles Parsons, (iii) Eli Whitney.

(m) Briefly outline the function of (i) a pneumatic sequencer or (ii) a pneumatic programmable logic controller.

2003 Question 1 Section A

Give brief answers to any ten of the following:

(a) Distinguish between the narcotic and irritant effects of toxic materials.

(b) Name **two** properties of materials used to facilitate ore dressing.

(c) Identify the main process used to manufacture the vice shown

(d) Differentiate between ionic and covalent bonding in solids.

(e) Identify and state a purpose for the electronic component shown.

(f) Explain the function of the flashback arrestors used in oxyacetylene welding.

(g) State a suitable material for manufacturing the greenhouse shown and give **three** reasons why this material is suitable.

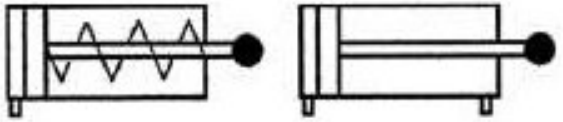
2003 Question 1 Section A cont.

(h) What environmental factors affect the corrosion rate of metals?

(i) Outline the advantages of using pneumatic power over electrical power.

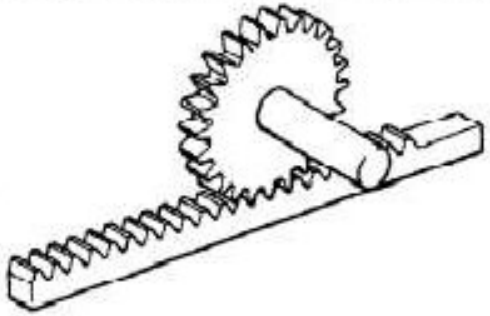
(j) What is meant by *factor of safety*?

(k) Distinguish between the **two** pneumatic cylinders shown.



(l) What contribution did **any one** of the following make to technology:
(i) German Sommeiller, (ii) Jack Kilby, (iii) Chester Carlson.

(m) Identify the mechanism shown below and outline **two** suitable applications.



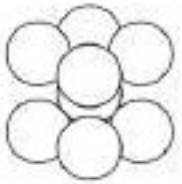
2004 Question 1 Section A

Give **brief answers** to **any ten** of the following:

(a) Differentiate between pyrometallurgy and hydrometallurgy.

(b) What contribution did **any one** of the following make to technology:
(i) Gustaf Dahlen , (ii) Willhelm Roentgen , (iii) Henry Maudsley.

(c) Identify the crystal structure shown and name **one** metal based on this structure.



(d) Name **any three** methods employed in the disposal of waste plastic.

(e) Name and suggest a suitable application for **one** of the thread forms shown.

(i) **(ii)**

(f) Outline the main properties of a metallic bond.

(g) Select **any two** of the abbreviations shown and explain their meaning:

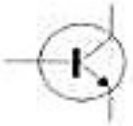
(i) LCD **(ii)** CD-ROM **(iii)** ISP **(iv)** DOS .

2004 Question 1 Section A cont.

(h) State the main process used to manufacture the wrench shown.

(i) Distinguish between crystalline and amorphous structures.

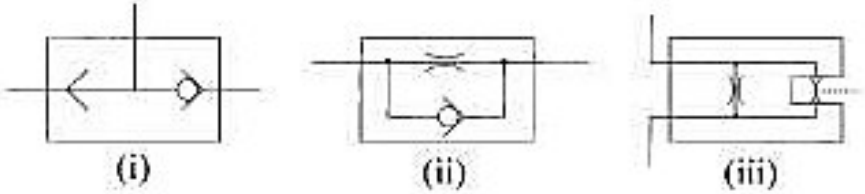
(j) Identify and state the purpose for the electronic component shown.



(k) Explain the meaning of the term *soaked* in relation to annealing.

(l) Outline the difference between generating and forming in machining.

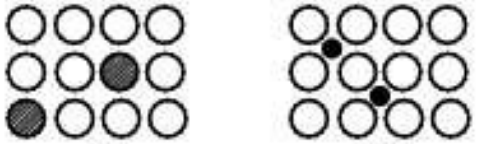
(m) Identify **any one** of the pneumatic symbols shown.



2005 Question 1 Section A

Give **brief answers** to **any ten** of the following:

(a) Distinguish between the crystal point defects shown.



(i) (ii)

(b) Explain the significance of **any one** of the following in electronics:
(i) heat sink, **(ii)** breadboard.

(c) Describe sacrificial protection with respect to corrosion prevention.

(d) What safety factors should be considered when joining materials using adhesives.

(e) Give **two** possible systemic effects of toxic materials.

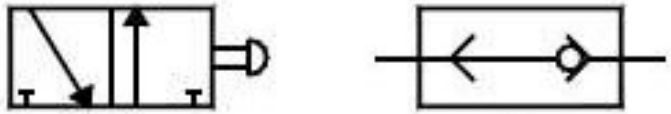
(f) Define the term *allotropy*.

(g) Describe the method of ore dressing in the diagram shown.

2005 Question 1 Section A cont.

(h) State a typical end product for **any two** of the following:
(i) Drop forging, **(ii)** Calendering, **(iii)** Casting.

(i) Identify **any one** of the pneumatic symbols shown.

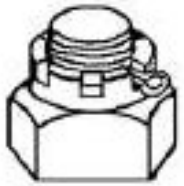


(i) (ii)

(j) Differentiate between an ionic bond and a metallic bond.

(k) Outline the function of a *parison* in manufacturing with polymers.

(l) Name and suggest a suitable application for the nut shown.



(m) What contribution did **any one** of the following make to technology:
(i) Henry Maudslay, **(ii)** Simon Stevins, **(iii)** Michael Faraday.

2006 Question 1 Section A

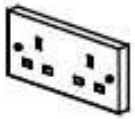
Give **brief answers** to **any ten** of the following:

(a) State the purpose of **any one** of the safety symbols shown.

(b) State **two** factors that affect corrosion rates in metals.

(c) In oxy-acetylene welding what is meant by dissolved acetylene?

(d) Identify the main process used to manufacture **any two** of the items shown:



(i) **(ii)** **(iii)**

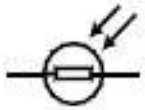
(e) Outline **two** safety precautions to be observed when working with toxic materials.

(f) Differentiate between a torsion force and a shear force.

(g) What contribution did **any one** of the following make to technology?
(i) Ivan Sikorsky, **(ii)** Theodore Maiman, **(iii)** Dugald Clerck.

2006 Question 1 Section A cont.

(h) Identify and outline the function of **any one** of the electronic components shown:



(i)

(ii)

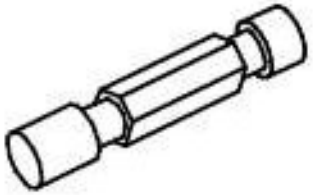
(i) List **two** essential advantages of using non-metals over metals.

(j) Describe the flotation separation method used in ore dressing.

(k) Explain the term copolymer.

(l) Select **any two** of the abbreviations shown and explain their meaning:
(i) CPU **(ii)** ISP **(iii)** CD-RW **(iv)** E-MAIL.

(m) Name and suggest a suitable application for the gauge shown.



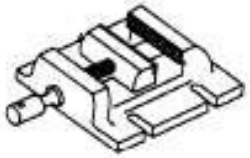
2007 Question 1 Section A

Give **brief answers** to **any ten** of the following:

(a) Outline **two** safety hazards associated with the use of adhesives when joining acrylic sheet.

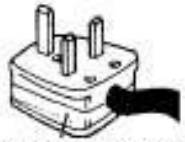
(b) Explain the term *Factor of Safety*.

(c) Identify the main processes used to manufacture **any two** of the items shown:



(i) Drill vice

(ii) Hair dryer

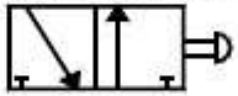


(iii) Plug casing

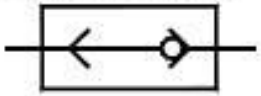
(d) Distinguish clearly between the computer terms ROM and RAM.

(e) Describe the differences between metal *fatigue* and metal *creep*.

(f) Identify **any one** of the pneumatic symbols shown:



(i)



(ii)

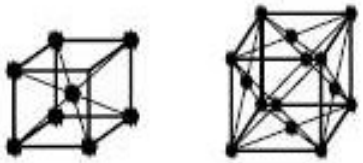
(g) Name **three** methods used in the disposal of used plastic materials.

2007 Question 1 Section A cont.

(h) Select **any two** of the abbreviations shown and explain their meaning:
(i) uPVC, **(ii)** IC, **(iii)** VDU, **(iv)** LED.

(i) Define the term *solvus* with reference to thermal equilibrium diagrams.

(j) Explain the principle of slip in terms of BCC and FCC crystal structures.



(k) Identify **two** ore dressing processes that are based on different metal properties.

(l) What contribution did **any one** of the following make to technology:
(i) John P. Holland, **(ii)** Viktor Kaplan, **(iii)** Eli Whitney?

(m) Name and suggest a suitable application for the gauge shown.

2008 Question 1 Section A

Give **brief answers** to **any ten** of the following:

(a) State the purpose of **any one** of the safety symbols shown.

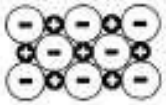
(i) 

(ii) 

(b) State **any two** aspects of design that will minimise the corrosion of metal products.

(c) Differentiate between pyrometallurgy and hydrometallurgy.

(d) Identify the bond structures represented below:

(i) 

(ii) 

(e) Outline **any two** safety precautions required to avoid the narcotic effects of toxic materials.

(f) Distinguish between amorphous and crystalline structures.

(g) What contribution did **any one** of the following make to technology?

(i) Christopher Cockerell, **(ii)** Theodore Maiman, **(iii)** Charles Parsons.

2008 Question 1 Section A cont.

(h) Identify and outline the function of **any one** of the electronic components shown:

(i) 

(ii) 

(i) State **any two** benefits of using compressed air systems in industry.

(j) Identify the main processes used to manufacture **any two** of the items shown:

(i) 

(ii) 

(iii) 

(k) Select **any two** of the abbreviations shown and explain their meaning:
(i) CPU **(ii)** LAN **(iii)** IC **(iv)** CD-RW.

(l) Identify **one** automatic welding process.

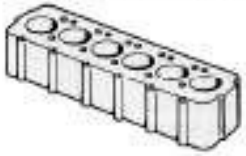
(m) Describe the use of *tolerance* in precision measurement.

2009 Question 1 Section A

Give **brief answers** to **any ten** of the following:

(a) Identify the main processes used to manufacture **any two** of the items shown:

(i) machine screw



(ii) cylinder head

(iii) key

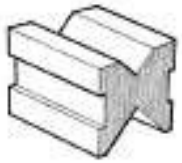
(b) Outline **two** safety precautions to be observed when using cutting fluids in a machining process.

(c) Distinguish between metal ore concentration and metal ore extraction.

(d) Identify **two** factors that influence fatigue failure in metals.

(e) State the difference between a single-acting cylinder and a double-acting cylinder in pneumatic control.

(f) Outline **one** use for the vee block shown.



(g) Define the term *Young's Modulus of Elasticity*.

2009 Question 1 Section A cont.

(h) Explain the function of a heat sink in electronic circuit assembly.

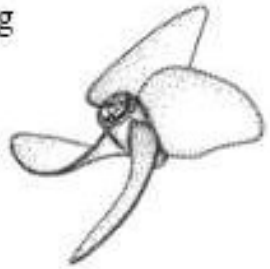
(i) Select **any two** of the abbreviations shown and explain their meaning:
(i) PCB **(ii)** uPVC **(iii)** SPST switch **(iv)** H.S.S.

(j) Describe the importance of the colour coding associated with workshop safety signs.

(k) Describe the term *elastic memory* with reference to thermoplastics.

(l) What contribution did **any one** of the following make to technology?
(i) James Dyson **(ii)** Igor Sikorsky **(iii)** Chester Carlson.

(m) Explain *sacrificial protection* as a method of preventing corrosion on the bronze propeller of a boat, as shown.



2010 Question 1 Section A

Give **brief answers** to **any ten** of the following:

(a) State the purpose of **any two** of the safety signs shown.

(i) (ii) (iii)

(b) Describe flotation separation as a method of ore dressing.

(c) Outline **two** reasons for the use of models **or** prototypes in the design and manufacture of cars.

(d) Identify **any two** finishing treatments that may be applied to mild steel to protect against corrosion.

(e) Describe the type of fracture in the tensile test specimen shown.

(f) State **any three** common applications of pneumatic control.

2010 Question 1 Section A cont.

(g) Select **any two** of the abbreviations shown and explain their meaning:
(i) LED **(ii)** IC **(iii)** http **(iv)** DVD.

(h) Outline the safety precautions to prevent *rancidity* when using cutting fluids.

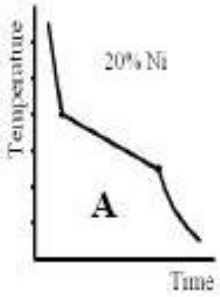
(i) What contribution did **any one** of the following make to technology?
(i) Steve Jobs **(ii)** John Logie Baird **(iii)** John P. Holland.

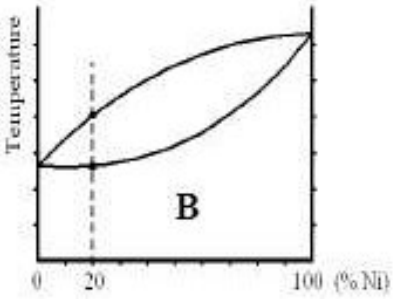
(j) Outline **two** methods of securing nuts in order to prevent loosening due to vibration.

(k) Why are *factors of safety* critically important in the design and manufacture of a helicopter?

(l) Identify **three** crystal point defects.

(m) Describe the relationship between the cooling curve **A** and the thermal equilibrium diagram **B** shown.





2011 Question 1 Section A

Give **brief answers** to **any ten** of the following:

(a) Describe the method of ore dressing shown opposite.

(b) Explain the term *co-polymer*.

(c) Identify **any three** barrier materials that may be applied to mild steel to protect against corrosion.

(d) Outline **three** factors to be observed in the safe use of adhesives.

(e) Describe **any two** properties of polypropylene that make it suitable as a material in the manufacture of stacking chairs for schools and colleges.

(f) Differentiate, with examples, between an electrical insulator and an electrical conductor.

(g) The innovative Irish designer, Eileen Gray, designed this table with a tubular steel frame. It is regarded as a design classic. Outline **two** reasons why tubular steel is a suitable material for this table.

2011 Question 1 Section A cont.

(h) Select **any two** of the abbreviations shown and explain their meaning:
(i) LCD **(ii)** PCB **(iii)** HSS **(iv)** DPDT switch.

(i) Distinguish between a *clearance* fit and an *interference* fit.

(j) What contribution did **any one** of the following make to technology?
(i) Trevor Baylis **(ii)** Charles Babbage **(iii)** Frank Whittle.

(k) Identify **any one** of the pneumatic components illustrated.

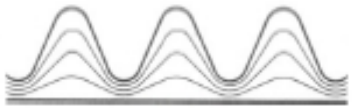
(i)

(ii)

(l) Describe the use of flashback arrestors in oxy-acetylene welding equipment.

(m) Compare the properties of the thread machined at **(i)** and the properties of the thread rolled at **(ii)** shown below.

(i)



(ii)

2012 Question 1 Section A

Give **brief answers** to **any ten** of the following:

(a) Identify the main processes used to manufacture the metal face guard of the hurling helmet shown.

(b) Explain the term *allotropy* with reference to carbon steel.

(c) State the purpose of **any two** of the safety signs shown.

(i)

(ii)

(iii)

(d) Outline **two** issues associated with the disposal of foamed polystyrene cartons.

(e) Describe the metallic bond, with the aid of a suitable diagram.

(f) Differentiate between a thermal conductor and an electrical conductor.

2012 Question 1 Section A cont.

(g) Newbridge Silverware® produced a range of jewellery in silver to mark 2011 as the 'Year of Craft' in Ireland.
Suggest **two** material properties that make silver suitable for craftwork.

(h) Explain the term *factor of safety*.

(i) Distinguish between a single-acting cylinder and a double-acting cylinder in pneumatic control.

(j) Explain the meaning of **any two** of the following abbreviations:

(i) ISP **(ii)** LDR **(iii)** RAM **(iv)** CAD.

(k) Discuss the contribution that **any one** of the following made to technology:

(i) George Devol **(ii)** Theodore Maiman **(iii)** Francis Beaufort.

(l) Describe the importance of the *evaluation* stage in the process of design.

(m) Describe, with the aid of a suitable diagram, **one** method used to secure a nylon gearwheel to the shaft of the DC motor shown.

2013 Question 1 Section A

Give **brief answers** to **any ten** of the following:

(a) Identify **two** common lubricating materials used in engineering machines.

(b) State the purpose of **any two** of the safety signs shown.

(i)

(ii)

(iii)

(c) Name **two** methods of ore dressing.

(d) Outline **two** environmental factors that increase the rate of corrosion in steel fixings.

(e) Compare the process of metal alloying and the process of co-polymerisation of plastic materials.

(f) The inventor, James Dyson, has developed this innovative design of a room heater. Explain the function of the *thermostatic control* device in this heater.

(g) Differentiate between systemic and narcotic effects of toxic materials.

2013 Question 1 Section A cont.

(h) Discuss the contribution that **any one** of the following has made to technology:
(i) Nicolaus Otto **(ii)** Frank Whittle **(iii)** Dugald Clerk.

(i) Identify **three** applications for pneumatic control in engineering.

(j) Explain **one** reason for the *anodising* of aluminium.

(k) Describe the constituents of the *carburising* flame used in oxy-acetylene welding.

(l) Explain the meaning of **any two** of the following abbreviations:
(i) IC **(ii)** LCD **(iii)** GRP **(iv)** CAM.

(m) Name the mechanism shown at **A** used in tuning a guitar.