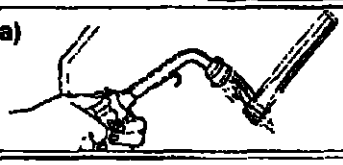
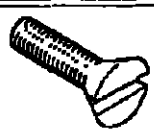
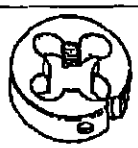
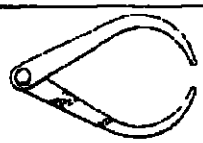
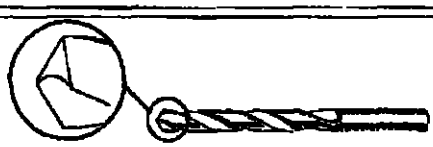
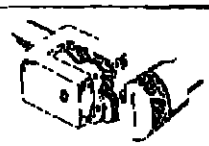
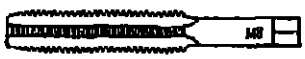
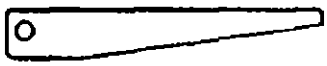
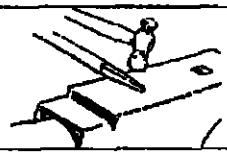
1.

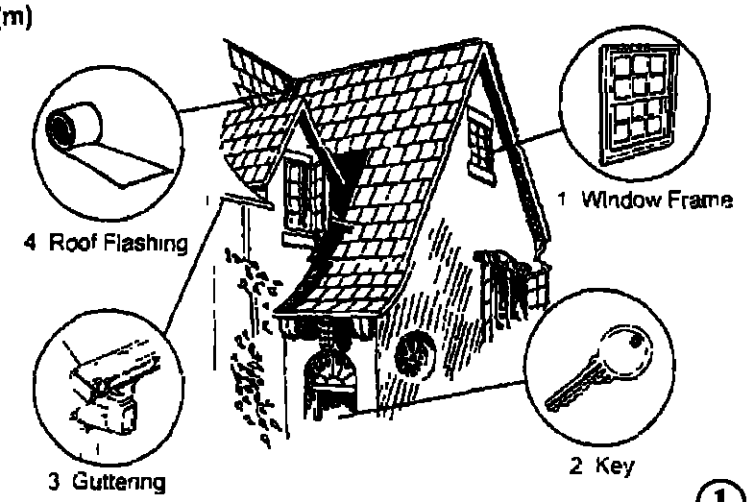
SECTION A - 20 MARKS
ANSWER ANY TEN QUESTIONS FROM THIS SECTION

40 Marks

(a) 	*After hardening, cold chisels should be*	Annealed Enamelled Tempered ✓ Normalised	2
(b) 	*This fastener is a.*	Grub Screw Cheese Head Screw Round Head Screw Countersunk Screw ✓	2
(c) 	*This cutting tool is a*	Die Nut Split Die ✓ Hand Reamer Centre Drill	2
(d) 	*This tool is a*	Round File Half-Round File Square File Flat File ✓	2
(e) 	*This sign warns of a(n)*	Toxic Hazard Fire Hazard Radiation Hazard Electrical Hazard ✓	2
(f) 	*This instrument is a(n)*	Vernier Calipers Inside Calipers Outside Calipers ✓ Odd-leg Calipers	2
(g) 	*The point angle of a standard twist drill is*	118° ✓ 150° 210° 60°	2
(h) 	*This lathe technique is called*	Parting Off Undercutting Knurling ✓ Facing	2
(i) 	*This tool is a(n)*	Adjustable Spanner Box Spanner Ring Spanner ✓ Open Spanner	2
(j) 	*This tap is used to cut*	Acme Threads Square Threads ISO Metric Threads ✓ Buttress Threads	2
(k) 	*This tool is used with a*	Brazing Hearth Power Saw Forge Drilling Machine ✓	2
(l) 	*This forging technique is called*	Drawing Down ✓ Forming an Eye Upsetting Punching	2

SECTION B - 20 MARKS
ANSWER ALL QUESTIONS FROM THIS SECTION

(m)



(i) Complete this chart by naming a non-ferrous metal suitable for each part

Part	Non-Ferrous Metal
1 Window Frames	**ALUMINIUM**
2 Key	**BRASS**
3 Guttering	**ALUMINIUM**
4 Roof Flashing	**LEAD**

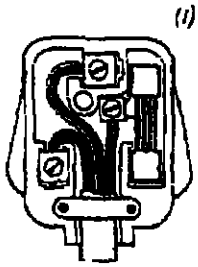
(Any three) 3 x 1

(ii) Name a plastic material suitable to make both the window frame and the guttering

(1) **PVC**

4 Marks

(n)



(i) The earth wire is colour coded

Red	
Brown	
Green/Yellow	✓
Blue	

(2)

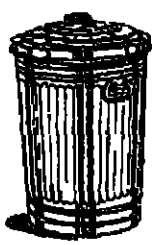
(ii) Household electricity uses

100V AC	
160V AC	
220V AC	✓
540V AC	

(2)

4 Marks

(o)



(i) Galvanised iron is mild steel coated with

Zinc	✓
Tin	
Copper	
Silver	

(2)

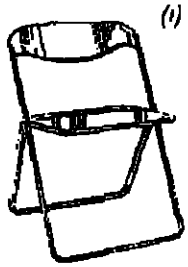
(ii) Which one of the following is an alloy?

Iron	
Copper	
Zinc	
Solder	✓

(2)

4 Marks

(p)



(i) Metal camping chairs are lightweight because they are made from

Solid Section	
Tubular Section	✓
Triangular Section	
Square Section	

(2)

(ii) A lever pivots about a fixed point called a

Structure	
Fulcrum	✓
Linkage	
Caliper	

(2)

4 Marks

(q)

(i) Olympic medals are made from

Silver Gold, Pewter	
Zinc, Gold, Silver	
Silver, Bronze, Gold	✓
Tin, Gold, Silver	

(2)

(ii) Which of the following metals is the best conductor of heat?

Mild Steel	
Cast Iron	
Copper	✓
High Carbon Steel	

(2)

4 Marks

2. **20 Marks**

(a)

(i) Complete the chart: **6 X 1**

Plastic Material	Thermosetting or Thermoplastic	List a use for each plastic
Polyurethanes	*Thermosetting*	*Flexible foam for upholstery*
Polythene	**THERMOPLASTIC**	**SHOPPING BAGS/ BOTTLES**
Acrylic	**THERMOPLASTIC**	**SHOP SIGNS/ BATHS**
Nylon	**THERMOPLASTIC**	**GEARS / BEARINGS**

(ii) The ability of a metal to withstand wear is called: (2)

Elasticity	
Hardness	✓
Brittleness	
Malleability	

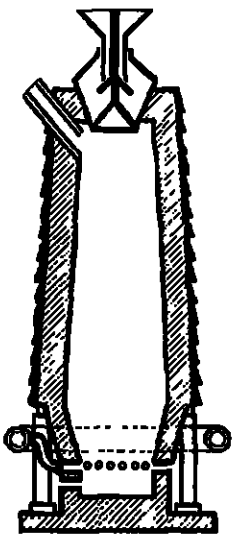
8 Marks

(b) Complete the chart. **6 X 1**

(i) Is the melting of a glass powder onto copper called enamelling?	Yes	✓
	No	
(ii) Is hollowing a method used to form copper bowls?	Yes	✓
	No	
(iii) Does copper work harden?	Yes	✓
	No	
(iv) Is repoussé the method used to produce raised designs in copper?	Yes	✓
	No	
(v) Does copper rust?	Yes	
	No	✓
(vi) Does engraving involve the use of acid?	Yes	
	No	✓

6 Marks

(c) Complete the chart: **6 X 1**

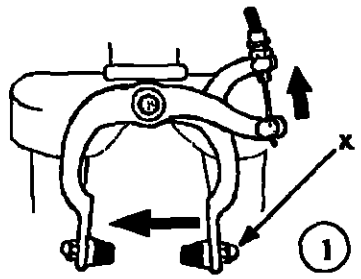


(i) Does this furnace produce Pig Iron?	Yes	✓
	No	
(ii) Does molten metal form part of the charge for this furnace?	Yes	
	No	✓
(iii) Is this a Basic Oxygen Furnace?	Yes	
	No	✓
(iv) Is hot air blown through the tuyeres of this furnace?	Yes	✓
	No	
(v) Can this furnace be tilted to pour the molten metal?	Yes	
	No	✓
(vi) Does molten metal fall to the bottom of this furnace?	Yes	✓
	No	

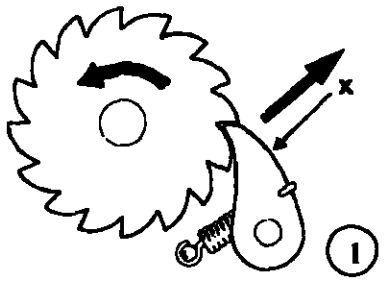
6 Marks

3. **20 Marks**

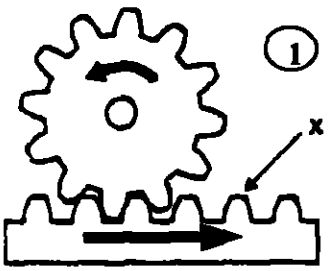
(a) **(i) Indicate with an arrow the direction of movement of part 'X' in each of the following:**

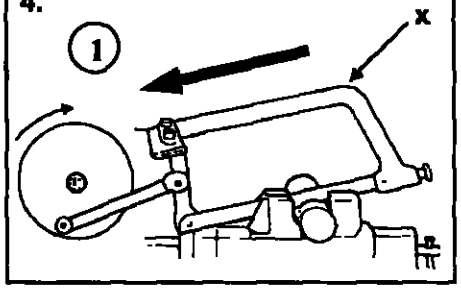
1. 

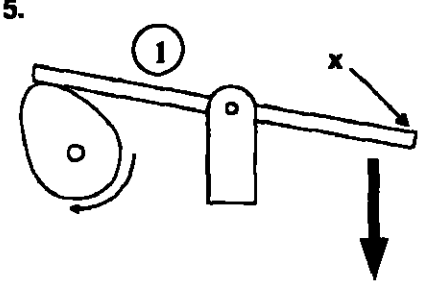
(1)

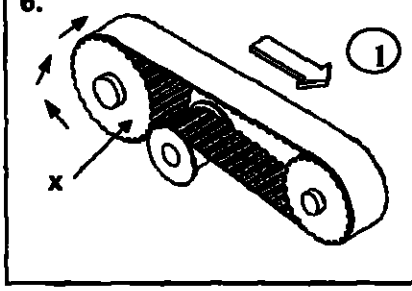
2. 

(1)

3. 

4. 

5. 

6. 

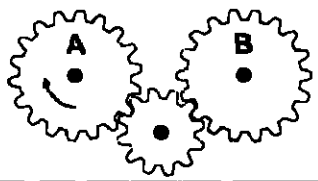
(ii) Name a machine that uses a rack and pinion mechanism. (2)

LATHE / DRILLING MACHINE

8 Marks

(b) **Answer the following:**

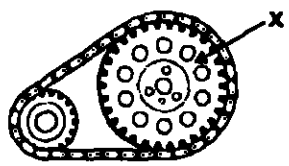
(i) Is gear 'B' turning anti-clockwise?



Yes	
No	✓

(1)

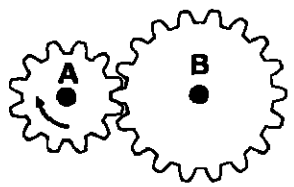
(ii) Is part 'X' called a rachet?



Yes	
No	✓

(1)

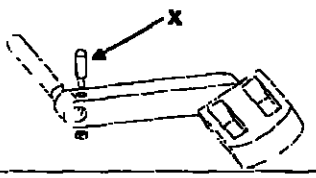
(iii) Does gear 'B' turn faster than gear 'A'?



Yes	
No	✓

(1)

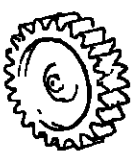
(iv) Is part 'X' called a cotter pin?



Yes	✓
No	

(1)

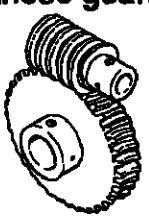
(v) Can gears be made from nylon?



Yes	✓
No	

(1)

(vi) Are these gears known as bevel gears?

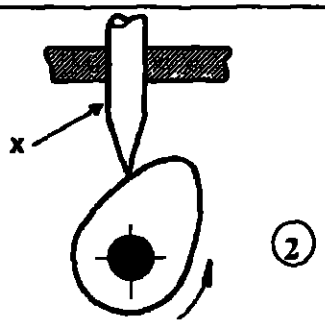


Yes	
No	✓

(1)

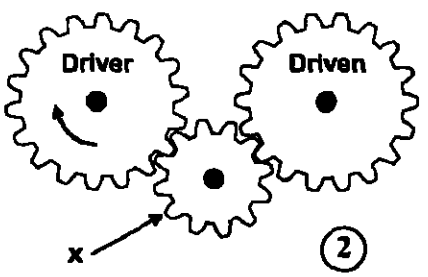
6 Marks

(c) **Name the mechanism part indicated by 'X' in each of the following:**

1. 

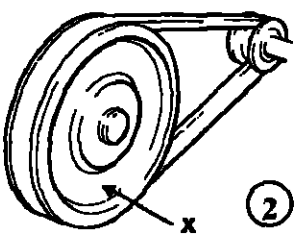
(2)

Name: FOLLOWER

2. 

(2)

Name: IDLER GEAR

3. 

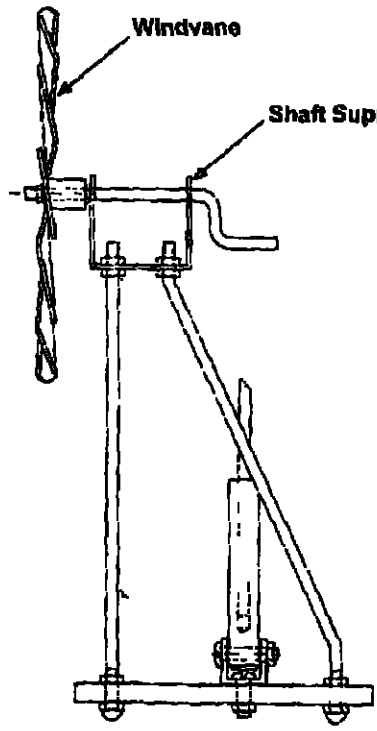
(2)

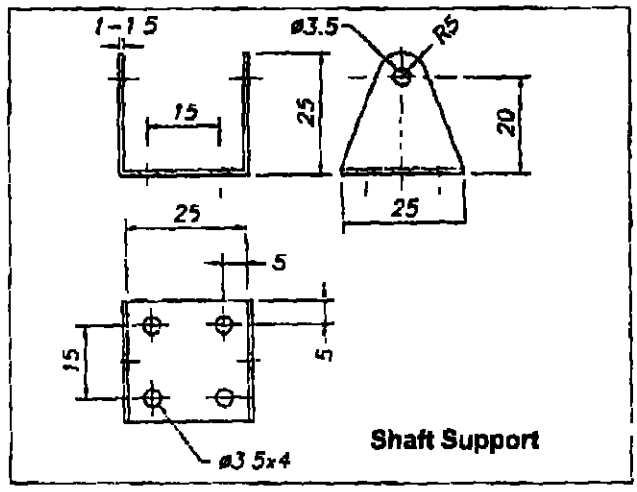
Name. PULLEY

6 Marks

4. **20 Marks**

Details of a Wind-Powered Pump are shown





(i) List the steps involved in making the Shaft Support from a blank piece of metal.

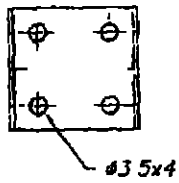
MARKING OUT /DRILLING

CUTTING /FILING / BENDING (3)

(ii) What does 'ø3 5x4' refer to in this drawing?

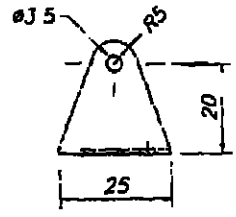
DRILL 4 HOLES

3.5 mm. IN DIAMETER (2)



(iii) What is the overall height of the Shaft Support?

(2) 25 mm.



(iv) What safety precautions should be taken when drilling sheet metal? (3)

WEAR SAFETY GOGGLES

TIDY CLOTHING /

CLAMP& SUPPORT WORK

(v) The Windvane is to be made from brass, copper or aluminium. What have these metals got in common?

(2) ALL NON-FERROUS METALS

12 Marks

(vi) Draw a development of the Shaft Support in the grid below

USE A PENCIL ONLY

CORRECT PROFILE 2

BEND LINES 2

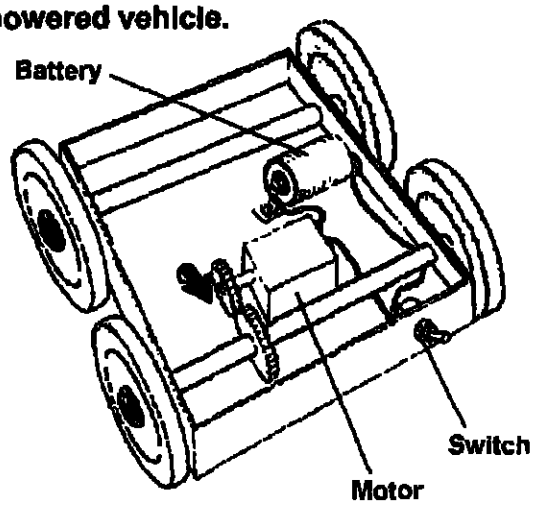
LAYOUT OF HOLES 2

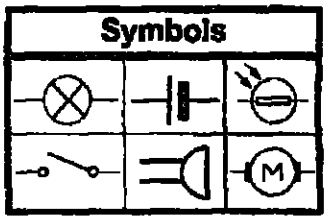
STANDARD OF DRAWING 2

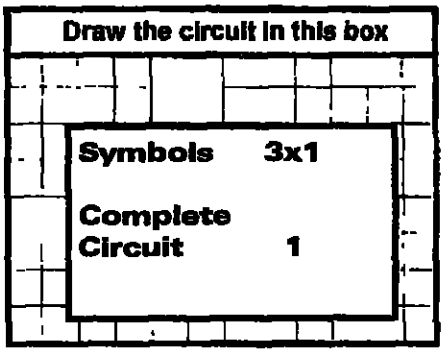
8 Marks

5. **20 Marks**

(a) (i) Select the correct symbols from the chart and complete the electrical circuit diagram for this motor powered vehicle.







(ii) Does a battery supply A.C. current?

(2) Yes ☐ No ☑

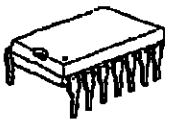
(iii) Does a motor convert electrical energy into mechanical energy?

(2) Yes ☑ No ☐

8 Marks

(b)

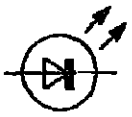
(I) This electronic component is a(n):



(2)

- Resistor ☐
- Buzzer ☐
- Integrated Circuit (IC) ☑
- Transistor ☐

(II) This symbol represents a(n):



(2)

- Switch ☐
- LDR ☐
- LED ☑
- Bulb ☐

(iii) Complete the chart:

Can the speed of an electric motor be changed?	(1)	Yes ☑ No ☐
Does solder, used for electronics, contain flux.	(1)	Yes ☑ No ☐

6 Marks

(c) Complete the chart by matching the inventor to the invention.

Inventors: Rudolf Diesel, John P. Holland, James Watt, Nicholas Otto, John Dunlop, Alexander Graham Bell

Invention	Inventor
1. Diesel Engine	Rudolf Diesel
2 Submarine	John P Holland
3 Four Stroke Engine	Nicholas Otto
4. Pneumatic Tyre	John Dunlop
5. Steam Engine	James Watt
6. Telephone	Alexander Graham Bell

6 x 1

6 Marks

6. 20 Marks

This drawing shows details of a mild steel wall bracket for a bird house.

(i) What is the total length of part 'A'?

140 (2)

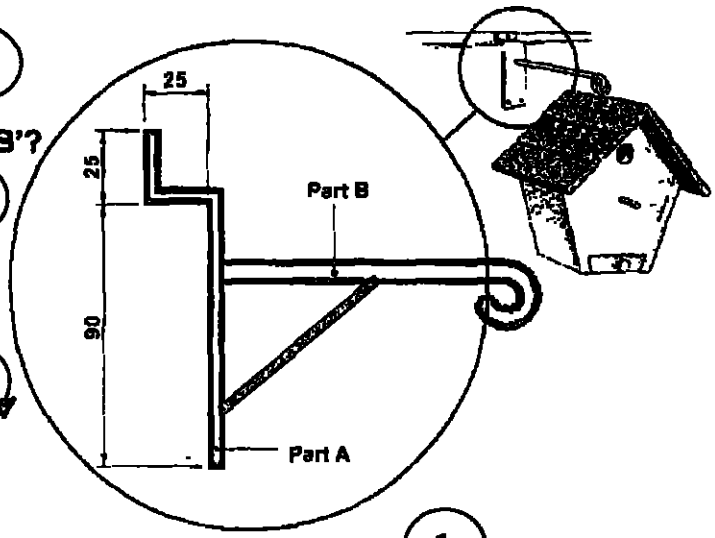
(ii) How would you join part 'A' to part 'B'?

BRAZING / WELDING (3)

(iii) How would you prevent the wall bracket from rusting?

PAINT / PLASTIC COAT (2)

(iv) Give details on this drawing of how the wall bracket could be strenghtened. (1)



(1)

(v) Does mild steel contain between 0.15% - 0.30% carbon? Yes ☑ No ☐

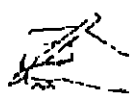
(vi) Briefly describe how the hook at the end of part 'B' could be formed.

MARK OUT / HEAT / (FORGE / TORCH)

BEND / HAMMER / (FORMER /ANVIL) (3)

12 Marks

(vii) Draw full size, in the box below, a complete development of part 'A' showing all bend lines (Width of part 'A' = 50mm)



USE A PENCIL ONLY

CORRECT PROFILE 3

BEND LINES 3

STANDARD OF DRAWING 2

8 Marks

JUNIOR CERTIFICATE EXAMINATION, 2001
METALWORK TECHNIQUES AND DESIGN

Marking Scheme
Ordinary Level Project

Part	Description	Marks	Total
Assembly	Supports to Base	2	10
	Supports to Shaft Support	2	
	Shaft to Shaft Support	2	
	Windvane to Shaft	2	
	Cylinder to Support to Base	2	
Finish	Finish/workmanship	10	10
Function	Function	10	10
Part 1 (Windvane)	Profile Vane Ø	5	16
	Slots	4	
	Holes	3	
	Hole *(centre)*	1	
	Bending	3	
Part 2 (Base)	Profile	4	7
	Holes	3	
Part 3 (Cylinder Support)	Profile	2	5
	Holes	2	
	Bending	1	
Part 4 (Support) (2 Off)	Profile	1	4
	Thread	1	
Part 5 (Support) (2 Off)	Profile	1	4
	Thread	1	
Part 6 (Cylinder)	Profile	2	4
	Holes	2	
Part 7 (Spacer)	Profile	1	2
	Holes	1	
Part 8 (Shaft Support)	Profile	8	13
	Holes	3	
	Bending	2	
Part 9 (Shaft)	Profile	3	5
	Thread	2	
Design		10	10
	Total	**100 x 3 = 300**	