Department of Education

Junior Certificate Examinations

2001

Materials and Technology

Metalwork

Higher Level

Marking Scheme

Question 1 - Section A **20 marks** **Only five parts to be counted**

(a) Thomas Edison - electric light bulb
Michael Faraday - electromagnetism/dynamo/electric motor/Faraday's Laws
Harry Ferguson - three point linkage/tractor
4 marks

(b) Valve - to allow mixture in or exhaust out
Name and purpose *(2 + 2)* **4 marks**

(c) The function of part 'B' is to open the valve **4 marks**

(d) The purpose of 'C' is cause the valve to close **4 marks**

(e) The function of part 'D' is to introduce the spark to the combustion chamber *(Spark plug to start engine - 1 mark)* **4 marks**

(f) Brittleness - material is easily broken
Density - ratio of mass over volume
Ferrous metal - metal / alloy containing iron *(Any two)* **4 marks**

(g) Identify and name two components - 1 = Light Emitting Diode /LED.
2=Light Dependent Resistor / LDR, 3= switch, 4= Lamp/bulb,
(Names of components but not identified - 2 marks) **4 marks**

Question 1 - Section B **20 marks** **Only five parts to be counted**

(a) Correct circuit diagram with correct symbols -
battery, switch, motor, - *(3 symbols 3 circuit 1)* **4 marks**

(b) Size eg M6, length, head, material **4 marks**
(Two correct - 3 marks, One correct - 2 marks)

(c) Suitable sketched design and description *(2 2)* **4 marks**

(d) Mark out - two lines - hold in vice - use twisting bar *(2 - 2)* **4 marks**

(e) (i) Using a try-square or bevel set to 90° *(2 marks)*
(ii) Using a bevel gauge set to 45° *(2 marks)* **4 marks**

(f) Part 5 provides lift, part 4 prevents spin *(2 + 2)* **4 marks**

Question 2 - 20 marks

(a) Any *two* important points - properties/cost/resistance to corrosion *(No marks for naming materials for parts)* *(2 x 1)* **2 marks**

(b) Any *two* important points *(2 x 1)* **2 marks**

(a) (i) Two improvements - with sketches - handles foot-rest - brake etc *2(2 + 2)* **8 marks**

(ii) Two materials and two reasons *(4 x 1)* **4 marks**

(iii) Case-hardening - putting a hard skin on mild steel - heat to red - dip in carbon powder - quench *Any two points*
Vacuum forming - heated thermoplastic sheet *Any two points*
Formed onto mould by action of vacuum *(2 + 2)*
4 marks

Question 3 20 marks

(a) Name operations *(3 x 1 - 3 marks)*
Explanation A - parallel turning - diameter is reduced by taking successive cuts, B - parting-off - cutting tool is moved straight into the work and cuts through
C - facing-off - cutting tool is moved across the end surface to produce flat surface finish
(Explanations 3 x 2 marks 6 marks)
9 marks

(b) Three safety precautions *(3 x 1)* **3 marks**

(a) Correct substitution *(3 marks)*
Correct answer - 2000 RPM *(1 mark)*
4 marks

(b) (i) Pilot hole - small hole to accurately locate large hole *(2 marks)*
(ii) Tapping size hole - hole drilled before tapping to allow Material for thread *(2 marks)*
Explanation and sketch (1 - 1)
4 marks

Question 4 20 marks

(a) Basic Oxygen Furnace **2 marks**

(b) Upright or tilted position - lance withdrawn - charge put in *(3 x 1)* **3 marks**

(c) Solid scrap iron/steel - then molten pig iron *(One right - 2 marks)* **3 marks**

(d) Lance withdrawn - furnace tilted at angle - contents poured **2 marks**

(e) Lance - to supply oxygen to surface of molten charge *(1 x 1)* **2 marks**

(f) (i) It is cooled by a flow of water through it **2 marks**

(g) Any two alloys, compositions and uses
(2 marks for composition, 1 marks for use) *(3 3)* **6 marks**

Question 5 20 marks

(a) A - Grind wheel - to grind metal, *(1 1)*
B - Cover/guard - to cover the grind wheel except at user point, *(1 x 1)*
C - Vee-belt - to transmit power from motor to shaft *(1 x 1)*
6 marks

(b) (i) Ratio = 2 1 or 1 2 **3 marks**

(ii) Grind wheel A turns at 1100 RPM **3 marks**

(c) AC = Alternating Current, 240V = 240 Volts, 500W = 500Watts
(Two correct - 3 marks, one correct - 2 marks)
4 marks

(d) Easy to cast to shape, provides weight for stability,
Most economic production method

Any two reasons *(2 x 2)* **4 marks**

Question 6 **20 marks**

(a) (i) Bit - made from copper, copper alloy *(1 - 1)* **2 marks**

(ii) Two properties - electrical insulator,
heat insulator, easily moulded, durable, tough *(2 x 1)* **2 marks**

(iii) Sketch - 1 mark, Live correct - 1 mark,
Neutral correct - 1 mark, Earth correct - 1 mark **4 marks**

(iv) For safety, to reduce voltage to safe level **2 marks**

(b) Can be taken apart, no special skill required,
Not as strong as welding, nuts may come off due to vibration
(2 marks for one advantage 2 marks for one disadvantage) **4 marks**

(c) Any *three* Malleability - can be hammered or rolled into thin sheet,
Melting point - the temperature at which a metal melts,
States of matter - solid, liquid and gas,
Hardness - resists scratching, wears well *(3 x 2)* **6 marks**

Question 7 **20 marks**

(a) A - Stepper motor - to move cross-slide/tool, B - 3-jaw chuck/chuck -
for holding workpiece, C - Toolpost - to hold the cutting tool
(Award 1 mark for name and 2marks for function - 2 x 3)
6 marks

(b) CPU - Central processing Unit
G-code - Code used in CNC
Menu - List of commands
Computer virus - Program that corrupts software
(Two correct - 3 marks, one correct - 2 marks)
4 marks

(c) Each correct direction - award 1 mark
4 marks

Piece 70mm long -
From menu select - define a profile mode, enter finished length =20mm,
Enter diameter of material = 20mm, choose line - vertical, set X=10,
choose line - horizontal, set Z = -20, select end

(Any three steps -3 x2) **6 marks**

JUNIOR CERTIFICATE EXAMINATION, 2001
METALWORK TECHNIQUES AND DESIGN

Marking Scheme
Higher Level Practical

Part	Description	Marks	Total
Assembly	Parts 2, 3 and 4 connected to Part 1	10	10
Finish	Finish/Workmanship	10	10
Function	Function	10	10
Part 1 (Base Plate)	Profile Hole	8 6	14
Part 2 (Lever)	Profile Bending Hole	∠ 5 15 5 1	26
Part 3 (Wheel)	Profile Lengths 2x2 Ø20 Hole	4 3 1	8
Part 4 (Shoe)	Profile Radii Width Hole	16 5 1	22
	Total	**100 x 1.5 = 150**	

JUNIOR CERTIFICATE EXAMINATION, 2001
METALWORK TECHNIQUES AND DESIGN

Marking Scheme
Higher Level Project

Part	Description	Marks	Total
Assembly	Parts 2 3 4. 5. and 7 attached to Part 1 Part 6 attached to Part 3. Electric Circuit	6 1 3	10
Finish	Finish/Workmanship	10	10
Function	Function	10	10
Part 1 (Base)	Profile Holes Bending	5 5 2	12
Part 2 (Cab)	Profile Holes Bending	9 5 6	20
Part 3 (Tail)	Profile Holes Twist	3 2 1	6
Part 4 (Skids) (2 off)	Profile Holes Bends	1 2 1	8
Part 5 (Supports) (4 off)	Profile Holes	0.5 0.5	4
Part 6 (Tail Rotor)	Profile Hole Twist	3 1 1	5
Part 7 (Battery Holder)	Profile Hole Bends	2 1 2	5
Design		10	10
	Total	**100 x 1.5 = 150**	