



*Junior Certificate Examination 2005*

***Materials Technology Wood***  
***Higher Level***



***Marking Scheme and***  
***Sample Solutions***

## SECTION A

Mark for best 16 answers. Disallow marks for any questions/parts of questions in excess of 16 as per instructions to Assistant Examiners

QUESTION	ANSWER	MARKS
1. (i)	Correct name for the tool...  <i>(Electric) Router</i>	3 marks
(ii)	Purpose of this tool  <i>To mould/shape the edges of timber, to remove grooves and rebates in timber</i>	2 marks
2.	Names of the defects shown ...  <i>A – Star shake B – Cup Shake C – Cupping</i>	2 x 2 marks 1 x 1 mark
3.	Correct names of the nails shown ...  <i>A - Round wire (nail) B - Oval (nail) C - Wiggle (nail)</i>	2 x 2 marks 1 x 1 mark
4.	The stage at which the most damage is caused to timber by a wood boring beetle is ...  <i>The Larva</i>	5 marks
5. (i)	The trees found in zone A would be ...  <i>Deciduous</i>	3 marks
(ii)	Characteristic that makes these trees suited to the climate ...  <ul style="list-style-type: none"> <li>• <i>Broad, spreading leaves</i></li> <li>• <i>Extensive fibrous root system</i></li> </ul>	2 marks
6. (i)	Correct name for method of seasoning ...  <i>Kiln or artificial seasoning</i>	3 marks
(ii)	The function of the steam is ...  <i>To maintain a controlled level of moisture in the kiln and the timber, thereby allowing the plank to dry evenly from the centre. Prevent splitting/case hardening</i>	2 marks

7		Meaning of the letters PVA ...  <i>P – Poly</i> <i>V – Vinyl</i> <i>A – Acetate</i>	<b>2 x 2 marks</b> <b>1 x 1 mark</b>
8.	(i)	Name of the plane ...  <i>Block plane</i>	<b>3 Marks</b>
	(ii)	Use of this in preference to a smoothing plane ...  <ul style="list-style-type: none"> <li>• <i>Planing end grain</i></li> <li>• <i>Planing small pieces of timber</i></li> <li>• <i>In difficult to reach places</i></li> </ul>	<b>2 Marks</b>
9.		Completed sketch of the stopped corner dovetail ...  <i>Sockets</i> <i>Tails</i>	<b>3 Marks</b> <b>2 Marks</b>
10.	(i)	Direction of rotation of pulley-wheel B ...  <i>Clockwise</i>	<b>3 Marks</b>
	(ii)	Rotational speed of pulley-wheel B ...  <i>600 RPM (240 x 2.5)</i>	<b>2 Marks</b>
11.		Two appropriate safety precautions for the electric drill ...  <ul style="list-style-type: none"> <li>• <i>Check that the flex is undamaged</i></li> <li>• <i>Ensure that the bit is held tightly in the chuck</i></li> <li>• <i>Make sure that the key is removed from the chuck</i></li> <li>• <i>No loose clothes</i></li> <li>• <i>Wear eye protection</i></li> </ul>	<b>1 x 3 marks</b> <b>1 x 2 marks</b>
12.		Correct name for the force applied by the holdfast ...  <i>Compression</i> Squashing /squeezing/ pressing down	<b>5 marks</b> <b>2 marks</b>
13.	(i)	Name of the tool ...  <i>Vernier calipers</i> Calipers	<b>3 marks</b> <b>2 marks</b>
	(ii)	Appropriate woodworking use for the tool ...  <ul style="list-style-type: none"> <li>• <i>Accurate measurement of smaller pieces of timber</i></li> <li>• <i>Checking the depth of holes/grooves accurately</i></li> <li>• <i>Measuring diameters to a high level of accuracy</i></li> </ul>	<b>2 marks</b>

14.	(i)	The main difference between ferrous and non-ferrous metals ...  <i>Ferrous metals contain iron, non-ferrous do not Ferrous metals rust, non-ferrous do not</i>	<b>2 marks</b>
	(ii)	Classification of metals ...  <i>Copper – Non-ferrous Steel – Ferrous Aluminum – Non-Ferrous</i>	<b>3 x 1 mark</b>
15.	(i)	Direction of planing end grain ...  <i>Arrow from right or Arrows from each edge towards the centre</i>	<b>3 marks</b>
	(ii)	Method that can be used to prevent the corners splitting ...  <ul style="list-style-type: none"> <li>• <i>Remove a small chamfer from the corner and plane into it</i></li> <li>• <i>Place a waste piece of timber firmly behind the back edge of the piece</i></li> </ul>	<b>2 marks</b>
16.		Names of the three trees ...  <i>A – Beech B – Horse Chestnut C – Oak</i>	<b>2 x 2 marks 1 x 1 mark</b>
17.	(i)	Two categories of plastics ...  <ul style="list-style-type: none"> <li>• <i>Thermoplastic</i></li> <li>• <i>Thermosetting</i></li> </ul>	<b>1 x 2 marks 1 x 1 mark</b>
	(ii)	Category of materials that can be heated and moulded only once ...  <i>Thermosetting</i>	<b>2 marks</b>
18.		Reason for the shape of the head of the carvers mallet ...  <ul style="list-style-type: none"> <li>• <i>It is round so that when in use the head always strikes the chisel or gouge at the correct angle.</i></li> <li>• <i>Easier to use when working around intricate objects</i></li> <li>• <i>Better balance for detailed carving</i></li> </ul>	<b>5 marks</b>
19.		Two safety precautions to observe with cellulose finishes ...  <ul style="list-style-type: none"> <li>• <i>Keep away from naked flames/sparks</i></li> <li>• <i>Ensure adequate ventilation</i></li> <li>• <i>Wear protective clothing and respirator</i></li> <li>• <i>Do not eat or drink</i></li> </ul>	<b>1 x 3 marks 1 x 2 marks</b>

20	Completed cutting list ...	<b>5 x 1 mark</b>																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">DESCRIPTION</th> <th style="text-align: center;">NUMBER</th> <th style="text-align: center;">L</th> <th style="text-align: center;">W</th> <th style="text-align: center;">T</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Base</td> <td style="text-align: center;">1</td> <td style="text-align: center;">225</td> <td style="text-align: center;"><i>175</i></td> <td style="text-align: center;">15</td> </tr> <tr> <td style="text-align: center;">Sides</td> <td style="text-align: center;">2</td> <td style="text-align: center;"><b>250</b></td> <td style="text-align: center;">170</td> <td style="text-align: center;">15</td> </tr> <tr> <td style="text-align: center;">Front</td> <td style="text-align: center;">1</td> <td style="text-align: center;">200</td> <td style="text-align: center;"><i>135</i></td> <td style="text-align: center;">15</td> </tr> <tr> <td style="text-align: center;">Back</td> <td style="text-align: center;">1</td> <td style="text-align: center;"><b>250</b></td> <td style="text-align: center;"><i>135</i></td> <td style="text-align: center;">15</td> </tr> </tbody> </table>			DESCRIPTION	NUMBER	L	W	T	Base	1	225	<i>175</i>	15	Sides	2	<b>250</b>	170	15	Front	1	200	<i>135</i>	15	Back	1	<b>250</b>	<i>135</i>	15
DESCRIPTION	NUMBER		L	W	T																						
Base	1		225	<i>175</i>	15																						
Sides	2		<b>250</b>	170	15																						
Front	1		200	<i>135</i>	15																						
Back	1	<b>250</b>	<i>135</i>	15																							

**Running total of allowed questions for this section to be recorded and shown as indicated at the marking conference.**

## SECTION B

Mark for best 3 answers. Check all stationary and indicate running total and disallowed marks as indicated at the marking conference.

QUESTION	ANSWER	MARKS
1. (i)	<p>Preparation of working drawing ...</p> <p><b>Elevation -</b></p> <p style="padding-left: 40px;"><i>Setting out overall width (1160)</i></p> <p style="padding-left: 40px;"><i>Showing overall height (965)</i></p> <p style="padding-left: 40px;"><i>Showing thickness of sides (25)</i></p> <p style="padding-left: 40px;"><i>Showing position of shelves</i></p> <p style="padding-left: 40px;"><i>Showing thickness of shelves</i></p> <p style="padding-left: 40px;"><i>Showing width of top rail</i></p> <p style="padding-left: 40px;"><i>Finding the centre and drawing the curve to the top rail</i></p> <p><b>End view -</b></p> <p style="padding-left: 40px;"><i>Setting out/transferring overall height</i></p> <p style="padding-left: 40px;"><i>Setting out to width (400)</i></p> <p style="padding-left: 40px;"><i>Showing leg widths (70)</i></p> <p style="padding-left: 40px;"><i>Transferring position and thickness of shelves</i></p> <p style="padding-left: 40px;"><i>Showing top of top rail</i></p> <p><b>General -</b></p> <p style="padding-left: 40px;"><i>Hidden detail (any lines)</i></p> <p style="padding-left: 40px;"><i>Scale</i></p> <p style="padding-left: 40px;"><i>Dimensions (any 4, any quality)</i></p> <p style="padding-left: 40px;"><i>Draughtsmanship, presentation...</i></p> <p><b>NOTE:</b></p> <p style="padding-left: 20px;">1. If isometric drawing presented, mark as per scheme and divide by 2 at end</p> <p style="padding-left: 20px;">2. If the wrong scale is used, no marks for height or width in elevation and loss of scale mark</p>	<p>2 marks</p> <p>2 marks</p> <p>1 mark</p> <p>3 x 1 mark</p> <p>3 x 1 mark</p> <p>1 marks</p> <p>2 marks</p> <p>1 mark</p> <p>1 mark</p> <p>2 x 1 mark</p> <p>4 x 1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>4 marks</p> <p>3 marks</p> <p>14</p> <p>9</p> <p>10</p>
(ii)	<p>Jointing shelf S to end piece E ...</p> <p style="padding-left: 40px;"><i>Finger or dovetail joints</i></p> <p style="padding-left: 40px;"><i>Dowelling/Biscuits</i></p> <p style="padding-left: 40px;"><i>Screws, sunk and plugged/concealed</i></p>	<p>5 + 2 marks</p> <p>7</p>

QUESTION	ANSWER	MARKS	
2. (i)	<p>Explanation of steps in design process...</p> <p><b>Investigation/Research -</b></p> <p><i>The process wherein you look at the problem, identify key requirements for the design solution and gather information that will allow you to arrive at possible design solutions. Looking for ideas, studying similar artefacts, etc.</i></p> <p><b>Design Ideas/Solution –</b></p> <p><i>Proposals based on the analysis of the brief and the investigation/research carried out that should meet all the requirements. One design idea or elements from several ideas can be brought together into the selected solution.</i></p>	<p>5 marks</p> <p>5 marks</p>	10
(ii)	<p>Design solution for storage of small gardening tools ...</p> <p><i>Basic unit/box without any design features (sketch only)</i>  <i>Fair attempt to accommodate items in an attractive, compact unit. (Must include notes)</i>  <i>Good, well balanced, well sketched design, showing some innovation, must incorporate SAFETY FEATURES and elements that make ACCESS to tools easy...</i></p>	<p>5 marks</p> <p>↓</p> <p>10 marks</p> <p>↓</p> <p>15 marks</p>	15
(iii)	<p>Suitable material for the manufacture of the unit ...</p> <p><i>Mark for any suitable material (Including manufactured boards)</i></p> <p>Reasons ...</p> <p><i>Reasons appropriate to selected material :  Cost, appearance, workability ,durability</i></p>	<p>1 mark</p> <p>2 x 3 marks</p>	7
(iv)	<p>Suitable applied finish for the unit ...</p> <p><i>Mark for any suitable finish, relative to the choice of material</i>  <i>Polyurethane varnish, paint, oil, ...</i></p> <p>Reasons ...</p> <p><i>Reasons appropriate to selected finish :  Appearance, ease of application, durability</i></p>	<p>2 marks</p> <p>2 x 3 marks</p>	8

QUESTION	ANSWER	MARKS										
3. (i)	<p>Methods of conversion shown in the diagrams...</p> <p><i>A- through and through or slash sawing</i> <i>B- Quarter or Radial sawing</i></p>	<p>6 marks</p> <p>6 marks</p>	12									
(ii)	<p>Advantages/Disadvantages of conversion methods ...</p> <table border="1"> <thead> <tr> <th></th> <th>ADVANTAGES</th> <th>DISADVANTAGES</th> </tr> </thead> <tbody> <tr> <td>SLASH SAWING</td> <td> <p><i>Fast, easy to set up and manipulate.</i></p> <p><i>Very little waste produced</i></p> <p><i>Wide boards</i></p> <p><i>Cheaper</i></p> </td> <td> <p><i>Boards prone to cupping</i></p> <p><i>Lot of sapwood in outer boards, prone to fungal and insect attack</i></p> </td> </tr> <tr> <td>QUARTER SAWING</td> <td> <p><i>Stable boards produced, all have ring lengths approx. equal</i></p> <p><i>Hardwearing board surface</i></p> </td> <td> <p><i>More manipulation and handling of the log required</i></p> <p><i>More waste produced</i></p> <p><i>Smaller boards</i></p> <p><i>More expensive</i></p> </td> </tr> </tbody> </table>		ADVANTAGES	DISADVANTAGES	SLASH SAWING	<p><i>Fast, easy to set up and manipulate.</i></p> <p><i>Very little waste produced</i></p> <p><i>Wide boards</i></p> <p><i>Cheaper</i></p>	<p><i>Boards prone to cupping</i></p> <p><i>Lot of sapwood in outer boards, prone to fungal and insect attack</i></p>	QUARTER SAWING	<p><i>Stable boards produced, all have ring lengths approx. equal</i></p> <p><i>Hardwearing board surface</i></p>	<p><i>More manipulation and handling of the log required</i></p> <p><i>More waste produced</i></p> <p><i>Smaller boards</i></p> <p><i>More expensive</i></p>	<p>8 x 2 marks</p>	16
	ADVANTAGES	DISADVANTAGES										
SLASH SAWING	<p><i>Fast, easy to set up and manipulate.</i></p> <p><i>Very little waste produced</i></p> <p><i>Wide boards</i></p> <p><i>Cheaper</i></p>	<p><i>Boards prone to cupping</i></p> <p><i>Lot of sapwood in outer boards, prone to fungal and insect attack</i></p>										
QUARTER SAWING	<p><i>Stable boards produced, all have ring lengths approx. equal</i></p> <p><i>Hardwearing board surface</i></p>	<p><i>More manipulation and handling of the log required</i></p> <p><i>More waste produced</i></p> <p><i>Smaller boards</i></p> <p><i>More expensive</i></p>										
(iii)	<p>Board most likely to cup ...</p> <p><i>Board M</i></p> <p>Reason ...</p> <p><i>Ring lengths on board M are of unequal lengths; as the rings shrink the amount of shrinkage along each ring will be different. As each ring shrinks, the board will be pulled into a curved or cupped shape by this uneven shrinkage.</i></p> <p>Direction of cupping...</p> <p><i>Direction of cupping is always <u>AWAY</u> from the pith</i></p>	<p>2 mark</p> <p>1 marks</p> <p>1 marks</p>	4									
(iv)	<p>Reasons why tropical rainforests should be conserved ...</p> <p><i>Protection of habitats, reduction of CO2 levels, aesthetics, rare flora/fauna, prevent silting of watercourses ...</i></p> <p>Approaches to the conservation of rain forests ...</p> <p><i>Use of softwoods, replanting of trees cut down, use hardwood veneers not solid timber, ... (accept political answers)</i></p>	<p>2 x 2 marks</p> <p>2 x 2 marks</p>	8									



QUESTION	ANSWER	MARKS	
4 (A). (i)	<p>Methods of laminating the supporting frame...</p> <ul style="list-style-type: none"> <li>• <i>Cutting of laminates to thickness of 3-5 mm</i></li> <li>• <i>Preparation of formers, the gap between male and female equal to thickness of finished member</i></li> <li>• <i>Laminates steamed to improve flexibility</i></li> <li>• <i>From the steambox placed in formers and cramped up dry to take shape</i></li> <li>• <i>After 1-2 days removed, glue applied to surfaces and then re-clamped</i></li> <li>• <i>Left until glue sets before removal for cleaning up</i></li> </ul> <p><i>Sketches</i></p>	<p>3 x 3 marks</p> <p>5 marks</p>	14
(ii)	<p>Suitable adhesive for laminating ...</p> <p><i>PVA, Casein glues, formaldehydes ...</i></p> <p>Mark for glue suitable for small laminate work, not superglue or brand names</p> <p>Reason ...</p> <p><i>Good open time, non-staining, good adhesion, gap filling, strength ...</i></p>	<p>2 marks</p> <p>2 marks</p>	4
(iii)	<p>Preparation of block for mounting and turning...</p> <ul style="list-style-type: none"> <li>• <i>Draw the diagonals on the face of the piece to locate the centre</i></li> <li>• <i>Draw the largest possible circle on the face using this centre</i></li> <li>• <i>Draw tangents to the circles to create an octagon on the face</i></li> <li>• <i>Cut the corners off the piece until it is octagonal in shape</i></li> <li>• <i>Or cut roughly to a circle outside the line</i></li> <li>• <i>Using the centre point as a guide, locate the face plate on the face and screw it onto the piece...</i></li> </ul> <p>Mounting on the lathe ...</p> <ul style="list-style-type: none"> <li>• <i>Screw the faceplate onto the spindle thread until hand tight</i></li> <li>• <i>Position the tool rest so that it is as close to the work piece as possible but does not touch it as it rotates</i></li> </ul>	<p>6 + 2 marks</p> <p>3 + 2 marks</p>	13
(iv)	<p>Three safety precautions to be observed when using the lathe...</p> <p><i>Ensure that work piece is securely held</i></p> <p><i>No loose clothing or hair</i></p> <p><i>Eye protection...</i></p>	<p>3 x 3 marks</p>	9

QUESTION	ANSWER	MARKS	
4 (B). (i)	<p>Marking out of shaping on headboard...</p> <ul style="list-style-type: none"> <li>• <i>Location of centreline of headboard</i></li> <li>• <i>Drawing of circle R50 with compass/dividers</i></li> <li>• <i>Location of centres for circles R150 and drawing of these</i></li> <li>• <i>Location of centres for circles R90 and drawing of these</i></li> <li>• <i>Completion of outline required heavy</i></li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>• <i>Mark the shape out on a template and copy onto the timber</i></li> </ul> <p>Cutting out of shaping on headboard...</p> <ul style="list-style-type: none"> <li>• <i>Cutting out of profile using a jigsaw, compass saw, bow saw, pad saw</i></li> <li>• <i>Use of rasps/surforms/drum sander/bobbin sander/flap wheel, to clean almost to the line</i></li> <li>• <i>Use of spokeshave to complete larger curves</i></li> <li>• <i>Finishing edges with abrasive paper held flat against the surface while wrapped around a piece of cork or timber</i></li> </ul>	<p>4 + 2 marks</p> <p>6 + 2 marks</p>	14
(ii)	<p>Suitable applied finish for the headboard ...</p> <p><i>Mark for any suitable applied finish: Cellulose lacquer, polyurethane varnish, paint, wax, oil ...</i></p> <p>Reasons ...</p> <p><i>Reasons appropriate to the selected finish : Appearance, ease of application, durability, protection, non-toxic...</i></p>	<p>2 marks</p> <p>2 x 3 marks</p>	8
(iii)	<p>Preparation of surface for the applied finish ...</p> <ul style="list-style-type: none"> <li>• <i>Punch nails</i></li> <li>• <i>Use a smoothing plane or scraper to remove pencil marks</i></li> <li>• <i>Fill any holes or imperfections</i></li> <li>• <i>Sand lightly moving from rough to smooth abrasive paper</i></li> <li>• <i>Dust down surfaces</i></li> <li>• <i>Wipe surface with a damp cloth</i></li> <li>• <i>Cut back with very smooth abrasive paper when dry</i></li> <li>• <i>Wipe down with white spirit ...</i></li> </ul>	<p>8 + 2 marks</p>	10
(iv)	<p>Application of the selected applied finish...</p> <ul style="list-style-type: none"> <li>• <i>Working with the grain</i></li> <li>• <i>Application of first coat</i></li> <li>• <i>Cutting back when dry</i></li> <li>• <i>Application of additional coats ...</i></li> </ul>	<p>6 + 2 marks</p>	8

QUESTION	ANSWER	MARKS	
5. (i)	<p>Correct names for the marking out tools ...</p> <p style="text-align: center;"> <b>A – (Spring) dividers/ (Scribing) compass</b>  <b>B – Sliding bevel</b>  <b>C – Mortise Gauge</b> </p>	<p><b>6 marks</b>  <b>6 marks</b>  <b>6 marks</b></p>	18
(ii)	<p>Inlaying the top of the CD holder ...</p> <ul style="list-style-type: none"> <li>• <i>True the surface</i></li> <li>• <i>Mark out pattern for inlay on top surface</i></li> <li>• <i>Mark out sides of groove with cutting gauge</i></li> <li>• <i>Using a scratch stock, scratch out the sides and ends of pattern</i></li> <li>• <i>Or use a router with a 6mm bit to cut groove</i></li> <li>• <i>Mark out and cut inlays with mitres at corners</i></li> <li>• <i>Glue the inlay in place with animal glue and tape in place</i></li> <li>• <i>Remove tape after glue cures and sand and clean off</i></li> </ul> <p><i>Mark for reasonable description, not individual points</i></p>	<p><b>6+2 marks</b></p>	
(iii)	<p>Marking out of the stopped dovetail housing ...</p> <p>Housing ...</p> <ul style="list-style-type: none"> <li>• <i>Locate the position of the square side of the trench on the piece and square this on the face and edge</i></li> <li>• <i>Measure over the width of the narrowest part of the dovetail (the neck) from this line</i></li> <li>• <i>Square this across the face and return slightly over the edge</i></li> <li>• <i>On the edge, measure over the widest part of the dovetail from the first line you drew.</i></li> <li>• <i>Gauge the depth of the trench between the two lines</i></li> <li>• <i>Join the narrow and wide marks on the edge to show the slope of the dovetail</i></li> <li>• <i>Gauge the length of the trench from the edge.</i></li> </ul> <p>Dovetail ...</p> <ul style="list-style-type: none"> <li>• <i>Square off the end of the piece to have the dovetail on it</i></li> <li>• <i>From the end come down a distance equal to the depth of the trench and square this all around</i></li> <li>• <i>Across the end, gauge the widest width of the dovetail</i></li> <li>• <i>On the pencil line down the depth of the trench from the end, gauge the narrowest part of the dovetail</i></li> <li>• <i>Join these points up to form the dovetail</i></li> <li>• <i>From the edge, gauge around the piece the length of the dovetail</i></li> </ul>	<p><b>5 + 2 marks</b></p> <p><b>5 + 2 marks</b></p>	14