L-Università ta' Malta

MATSEC
Examinations Board

Marking Scheme

IM Eng. Drawing & Graphical Com.

First Session 2025

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SECTION 'A'

Question No		Solution	Marks distribution	Marks
1		**Helical Trophy**		
	a	Copy the given starting lines.	1	1
	b	Draw a half plan Ø120 mm and Ø100 mm and divide into six equal segments.	0.5	1
		Project lines upwards from the angular divisions	0.5	
	c	Mark out the lead (180mm) and divide into 12 equal parts by drawing horizontal lines.	1	5
		Mark the terminations of helices a-a1, b-b1, c-c1 and d-d1.	0.5	
		Project lines from the half plan	0.5	
		Plot the correct intersections of helix a-a1.	1	
		Plot the correct intersections of helix b-b1	1	
		Plot the correct intersections of helix c-c1	0.5	
		Plot the correct intersections of helix d-d1	0.5	
	d	Plot the correct intersections of helix p-p1	0.5	4
		Plot the correct intersections of helix q-q1	1	
		Plot the correct intersections of helix r-r1	1	
		Plot the correct intersections of helix s-s1	0.5	
		Line in the visible parts of the helices	1	
	e	Neatness and presentation	1	1
	f	State the direction of both helices (both right-hand)	1	1
Total:				**13**
2		**Solids in Contact**		
	a	Locate the centres of the SØ50 spheres in the plan, 100 mm apart and forming an equilateral triangle.	1.5	3
		Project the centres from plan to front elevation.	1.5	
	b	Locate the centre of the SØ100 in the plan by bisecting angles of equilateral triangle. Use of protractor or 30° set square is accepted.	1	1
	c	Project an auxiliary view or end elevation to locate the point of contact between the SØ100 hemisphere and one of the SØ50 spheres, thus the height of bowl centre from the horizontal plane (94 mm).	2	2
	d	Draw the hemi-spherical bowl in the three views.	1	1

	e	Locate, in the front elevation, the point of contact between one SØ50 spheres and the SØ30 sphere (the axis joining both spheres has to be at right angles to the viewing position).	0.5	2
		Project the centre of the SØ30 sphere to the plan and rotate around two SØ50 spheres to locate the position of the SØ30 in the plan.	0.5	
		Draw the SØ30 sphere in the plan and in the front elevation.	1	
	f	Line in visible arcs and circles in both views.	1	1
	g	Show hidden details.	1	1
	h	Show the points of contact in both views	2	2
Total:				**13**
3		**Transition Piece**		
	a	Copy the given orthographic views	3	3
	b	Divide the semi-circle into 6 equal parts and draw crease lines in the plan.	2	3
		Divide the semi-circle into 6 equal parts and draw crease lines in the front elevation.	1	
	c	Construct the required true lengths (7 required).	3.5	4
		Draw XY (true length) to start the surface development.	0.5	
	d	Construct a half surface development of the transition piece. (If the flat part is omitted deduct 0.5 marks)	3	3
Total:				**13**
4		**Intersecting hexagonal prism and pyramid**		
	a	Copy Figure 4b.	2	2
	b	Use the section or generator method to plot the lines of intersection in the plan.	4	4
	c	Project lines from the plan to plot the lines of intersection in the front elevation.	3	3
	d	Construct the development of the hexagonal prism using the parallel method.		4
		Correct length (180 mm).	1	
		Correct height (73 mm.)	1	
		Correct intermediate points on sides of hexagonal prism.	0.5	
		Correct other heights.	1	
		Fold lines.	0.5	
Total:			**13**	

5		**Three Forces in Equilibrium**		
	a	Copy Figure 5b to a scale of 10 mm representing 1 m.	2	2
	b	Neatly print the Space Diagram Scale	0.5	4
		Label the spaces using the Bow's notation.	0.5	
		Select and print the Force Diagram Scale	0.5	
		Construct the polar diagram.	1	
		Transfer the angles from the polar diagram to the space diagram.	1	
		Determine the resultant of the two parallel forces (5.4 m from wall).	0.5	
	c	Locate the point of concurrency.	1	1
	d	Draw a force diagram.	3	3
	e	Measure and state the magnitude of the tension in tie rod BC (72 kN)	1.5	3
		Determine the direction and sense of the reaction of hinge 'A' (46° rightwards and upwards)	1.5	
Total:				**13**

SECTION 'B'

6		**Drilling Jig**		
	a	**Plan** (8 marks)		8
		Draw a Ø160 circle to represent the circular jig plate profile of the base.	0.5	
		Draw the Ø116 PCD	0.5	
		Locate centres of six equally spaced holes and draw four holes	1.5	
		Draw two bushes in holes 'P' and 'Q'	0.5	
		Draw the latch washer.	2	
		Draw the cheese head screw	0.5	
		Draw the M12 threaded nut.	2	
		Draw the cutting plane X – X.	0.5	
	b	**Front Elevation** Section X – X **Left-hand** side (7 marks)		16
		Draw the outside view of the base plate.	1	
		Draw the outside view of the work piece.	1	
		Draw the outside view of the jig plate.	1	
		Draw the outside view of the latch.	1	
		Draw the outside view of the bush.	1	

		Draw the outside view of the nut.	1	
		Draw the outside view of the threaded portion of the stem.	1	
		Front Elevation Section X - X **Right-hand side** (9 marks)		
		Draw the sectioned view of the base plate except for the web.	1	
		Draw the outside views of the stem except from the lower part section.	2	
		Draw the outside view of the stem screw.	1	
		Draw the sectional view of the jig plate except for the holes.	1	
		Draw the sectional view of the bush	1	
		Draw the sectional view of the workpiece.	1	
		Draw the sectional view of the latch washer.	1	
		Draw the sectional view of the latch washer.	1	
Total:				**24**
7		**Engineering Component**		
	a	**Freehand Sketch** (4 marks)		
		Draw a well-proportioned crate placing X at the lowermost position.	1	4
		Draw the lower part of the component.	1	
		Draw the central part of the component.	1	
		Draw the upper part of the component.	1	
	b	**Isometric drawing** (14 marks)		
		Draw the crate 114 mm x 64 mm x 184 mm and label corner X	0.5	
		Draw the base	1	
		Draw the two lower pillars.	1	
		Construct the Ø75 circular boss.	2	
		Construct the Ø55 hole in the boss.	3	14
		Draw the upper and lower lugs complete with the holes.	3	
		Draw the web	1	
		Construct the two Ø30 holes	2	
		Complete the drawing.	0.5	
	c	**Clamping feature** (6 marks)		
		Copy figure 7b to a scale of 2:1.	1	
		Draw an M24 x 100 mm long hexagonal head bolt according to ISO.	3	6
		Draw an M24 nut.	2	
Total:				**24**

SECTION 'C'

8		**Overseas trip** (Pictorial Chart)		
	a	Prepare annotated preparatory sketches to illustrate your developing ideas regarding the layout and presentation of the chart	2	2
	b	Label the chart with the heading: Get Ready for Adventure	2	2
	c	Draw creative pictorial illustrations to represent essential items for packing in the luggage.		16
		The Chart should include the luggage as a central element	4	
		Neatly stacked clothing	2	
		A raincoat and sunglasses	2	
		A pair of comfortable walking shoes	2	
		Toiletries such as toothbrush and toothpaste	2	
		Money and travel documents such as passport	2	
		Electronics such as a mobile phone and a charger	2	
	d	Design a chart with ideograms to visually represent the weather forecast for the 4-day trip, so that the students can prepare adequate clothing for their travel		4
		Day 1: Sunny with scattered clouds (a beautiful, mild day with sunshine and a few clouds)	1	
		Day 2: Cloudy with light rain (light rain showers will persist throughout the day)	1	
		Day 3: Clear skies and breezy (a bright and breezy day with sunny skies)	1	
		Day 4: Thunderstorms (a day filled with thunderstorms and heavy rain)	1	
Total:				**24**
9		**Wooden treehouse (two - point perspective)**		
	a	Construct the perspective crate (200 x 240 x 300)	1.5	21
		Eye level position (220 from base)	0.5	
		Use a correct vertical perspective grid	1	
		Correct foreshortening so that all lines converge to the midpoint	4	
		Construct the three wooden beams supporting the tree house	1	
		Construct the base platform of the tree house	1	
		Construct the rectangular section of the house	2	
		Add the sloped roof to the building	2	

		Construct the door	1	
		Construct the big window	1	
		Construct the attic window	1	
		Construct the dormer with a window	3	
		Construct the L shape railing	2	
	b	Render in colour the drawing to enhance presentation	3	3
Total:				**24**