AM SYLLABUS (2021)

ENGINEERING DRAWING	**AM 09**
SYLLABUS	

AM09 Engineering
Syllabus Addendum
Mitigating factors for 2021 MATSEC Examinations Session

Changes in Subject Content	The following content will not be assessed: **Paper I:** Section 1: "The construction of a tangent and a normal to the ellipse and parabola from a given point outside the curve." Section 2: " … their derived curves."; "… and its trochoids." Section 4: "Applications of the helix: internal" Section 6: Watt's straight-line motion. Section 7: "Types of cams: wedge and end cams." Section 8: "… the use of the isometric scale." Section 9: "… the bearing and slope of the shortest distance." Section 10: 　　"The lines of intersection between two triangles or other plane laminae." 　　"resting on" *(in last line)* Section 11: 　　f) sphere/hemisphere and prism/cylinder 　　g) sphere and cone. 　　The construction of the curve of intersection that results on: 　　a) palm-ended rods and eccentric cylinders; Section 14: 　　c) light hinged beams; 　　All the third paragraph starting, "Framed structures …" **Paper II** Section 3: All the third paragraph starting, "Geometrical tolerances …" Section 5: 　　a) screw fasteners and screw threads; 　　e) bearings; 　　g) hole preparations. **Other notes:** Paper I Section 10: 　　　"the dihedral angle" to read as "the dihedral angle of bent plates (cleats)" 　　　　To add a note: "Compound solids are not included." Note changes indicated in the document hereunder as follows: 　• Added information - highlighted and bold 　• Content which will not be assessed - strikethrough
Changes in Coursework	Coursework: To remove task 3. Marks of task 3 will be divided equally between task 1 and task 2.
Changes in Exam Paper(s)	Paper 1 - 8 questions to choose 5 Paper 2 - Compulsory question to remain as is; 4 questions to choose 2

Paper I

1.   The cone and the conic sections.

Conics regarded as sections of a right cone.
Conics regarded as plane loci of a moving point using the ratio of eccentricity.
The construction of a tangent and a normal at a point on the conics.
~~The construction of a tangent and a normal to the ellipse and parabola from a given point outside the curve.~~
Use of the focal sphere to find the ratio of eccentricity, the position of the directrix and the focal point/s of a conic.
Drawing the conics using the following methods:
  o the parabola in a rectangle;
  o the ellipse using the auxiliary circles;
  o the ellipse in a rectangle;
  o the ellipse using the intersecting arc method, $PF_1 + PF_2 = V_1V_2$;
  o the hyperbola given the asymptotes and a point on it;
  o the hyperbola using the intersecting arc method, $PF_1 - PF_2 = V_1V_2$.
The hyperbola and the auxiliary circle. Knowing the directrices, finding the asymptotes and vice versa.
The centre of curvature at a point on the ellipse, parabola and hyperbola, the point not being a vertex.

2.   Cycloidal curves

The construction of the cycloid, epicycloid, hypocycloid and ~~their derived curves.~~
The tangent, normal and centre of curvature at a point on the cycloid ~~and its trochoids.~~

4.   Helices and screw threads

The helix: right-hand and left-hand.
The true length of the helix.
The helix angle, excluding its application as being the true angle of the tangent drawn at any point on the helix.
~~Applications of the helix:~~ the helical vane; round-, square- and rectangular-section springs; one- and two-start, ~~internal~~ or external, vee and square threads.

6.   Coplanar loci of points on moving mechanisms.

Slider-crank mechanism.
Equal and unequal connected cranks.
~~Watt's straight-line motion.~~
Quick-return mechanism.
Geared link mechanisms.
The drawing of displacement diagrams related to the above.

7. Cams

Types of motion: Dwell, Uniform Velocity (UV), Simple Harmonic Motion (SHM), Uniform Acceleration (UA), Uniform Retardation (UR), and Uniform Acceleration and Retardation (UAR).
Types of followers: knife-edged, flat-foot and roller-ended.
The line of action of the follower may be in-line or offset relative to the axis of the cam.
~~Types of cams: wedge,~~ disc, cams with radial arm followers and ~~end cams~~.
Problems will only be set to derive the cam profile from given cam and follower data.

8. Projections

Isometric projection ~~and the use of the isometric scale~~. First
and second auxiliary projection of shapes and solids.

9. Projection of Lines

Lines inclined to the horizontal plane (H.P.) and the vertical plane (V.P.); the determination of their true lengths, their true inclination to the H.P. and the V.P.
Skew lines; the shortest distance between two skew lines; ~~the bearing and slope of the shortest distance.~~

10. Planes

Planes inclined to the horizontal plane (H.P.) and the vertical plane (V.P.); true angles between two planes: the dihedral angle **of bent plates (cleats).**
~~The lines of intersection between two triangles or other plane laminae.~~

Oblique planes and their traces; the conversion of an oblique plane into a perpendicular inclined plane by means of auxiliary views; the true inclination to the horizontal and vertical planes determined using auxiliary projection or the technique of rabatment.

Lines, geometrical shapes and solids ~~resting on,~~ or cut by oblique planes.
Compound solids are not included.

11. Intersection of Solids

Intersections of geometrical solids, between:
   a) two prisms;
   b) two cylinders;
   c) prism and cylinder;
   d) cone and prism/cylinder;
   e) pyramid and prism/cylinder;
   f) ~~sphere/hemisphere and prism/cylinder;~~
   g) ~~sphere and cone.~~

All solids are right, with the cones and pyramids standing on their bases.
Prisms and cylinders may be inclined to one plane of reference.
All above categories may include cases of offset middle planes.

~~The construction of the curve of intersection that results on:~~
    ~~a)   palm-ended rods and eccentric cylinders;~~
    b) rods of hexagonal section joined to cones or spheres.

14.   Graphical Statics

Coplanar concurrent and non-concurrent forces.
The use of Bow's notation, the polar diagram and the link polygon to determine graphically the resultant/equilibrant of a system of forces.

Shear Force and Bending Moment diagrams for:
a)   light cantilevers;
b)   light simply supported beams;
c)   ~~light hinged beams~~ - the beam is made of two parts, hinged together,
when these are subjected to vertical point loads and uniformly distributed loads (udl).

~~Framed structures; the use of space and force diagrams to framework problems to determine graphically the reactions and forces in members; the distinction between struts and ties. The applied external loading is limited to vertical point loads.~~

Paper II

3.   Dimensioning and tolerances

The dimensioning of drawings from centre and reference lines, machined and datum surfaces.

Limits and fits; clearance, transition and interference fits.
The method of indicating tolerances for selected ISO fits using hole basis. Candidates should be able to read and apply Data Sheet 4500A, which will be provided if required.

~~Geometrical tolerances to BS EN ISO 1101 covering straightness, flatness, roundness, cylindricity, profile of a line, profile of a surface, parallelism, squareness, angularity, position, concentricity, symmetry, runout and total runout. Material conditions are excluded.~~

5.   Freehand sketches

Freehand sketching to extend knowledge and appreciation of:
    ~~a)   screw fasteners and screw threads;~~
    b) locking devices;
    c) keys, keyways and splines;
    d) shaft couplings;
    ~~e)   bearings;~~
    f) pistons, connecting rods and crankshafts;
    ~~g)   hole preparations: countersinks, counterbores and spotfaces.~~

Engineering Drawing	**AM09** (Available in September)
Syllabus	Paper I (3 hrs) + Paper II (3 hrs) + CAD coursework

Aims

The aims of the syllabus are:

a) to explore further and confirm the direct relevance of engineering drawing to the varied design applications found in engineering and technology in general;
b) to further the ability to communicate engineering information by engineering drawings;
c) to develop further the skill of representing design concepts and solutions using both freehand and accurate drawings;
d) to develop an accurate level of draughtsmanship that respects established draughting codes, practices and conventions;
e) to develop a knowledge of two-dimensional (2D) computer-aided draughting (CAD).

Assessment Objectives

Candidates will be required to:

a) demonstrate their ability to read and evaluate engineering design drawings;
b) demonstrate their ability to apply the principles of plane and descriptive geometries to solve engineering problems;
c) model, orthographically and in three dimensions, problem situations utilising the most appropriate methods and techniques;
d) produce neat, clear and proportional drawings consistent with recognised codes and conventions;
e) produce computer-generated drawings using computer-aided design software.

It is anticipated that this syllabus will form a two-year course with a time allocation of around 360 hours. Candidates following this course are assumed to hold a pass grade of the SEC29 Graphical Communication syllabus.

Scheme of Assessment

Engineering Drawing shall have a continually assessed CAD component and a written examination as detailed below.

The final grade (grade A to grade E) shall be based on the combined marks obtained in the written examination and the CAD portfolio. To qualify for a pass in the subject, candidates **must** satisfy the examiners in both parts.

Marks distribution
Written examination: 80% of total marks
CAD portfolio: 20% of total marks

i)   The written examination

The examination will consist of two written papers, Paper I and Paper II, of three hours duration each. Paper I and Paper II carry equal weightings of marks. The candidates **must** satisfy the examiners in both papers.

Any examination question can test material from more than one topic.

Candidates are required to provide their own A2 size drawing board and draughting equipment. In particular the candidates should have a superbow compass capable of handling measurements of around 160mm. Such a compass should also be expandable, by the fitment of a matching extension.

Only non-programmable calculators are allowed. The use of draughting aids is permitted.

Questions in both papers will be set in SI units and in accordance with the revised editions of PP8888-1 and PP8888-2.

ii)   The CAD portfolio

Each candidate shall present a portfolio of three hard-copy, graded CAD practical exercises, set by the teacher to cover the syllabus. It is suggested that the first two exercises will be held during the first year of the course, with the third exercise left for the second year. These exercises shall be marked by the class tutor during the two-year course, according to a marking scheme, guide- lines and instructions. The mark of the portfolio shall be submitted to the MATSEC Board by a date stipulated by the unit.

Private candidates

Private candidates are to have a tutor who is knowledgeable in the subject and is familiar with the requirements of the syllabus to guide them in the process. Private candidates and their tutor are to fill in an authentication form which can be obtained from the MATSEC website. Private Candidates are to submit all exercises to the MATSEC Support Unit, for assessment by the Markers Panel, by the date stipulated by the unit. Candidates may be called for an interview about their work.

The Subject Content

The written examination

Paper I (max 100 marks)

Paper I is common to both Graphical Communication (AM15) and Engineering Drawing (AM09). It will contain six questions of which the candidates are required to answer any five. All questions will carry equal marks. All five questions are to be answered on A2 size sheets, which will be provided.

1. The cone and the conic sections.

Conics regarded as sections of a right cone.
Conics regarded as plane loci of a moving point using the ratio of eccentricity.
The construction of a tangent and a normal at a point on the conics.
The construction of a tangent and a normal to the ellipse and parabola from a given point outside the curve.
Use of the focal sphere to find the ratio of eccentricity, the position of the directrix and the focal point/s of a conic.
Drawing the conics using the following methods:
  o the parabola in a rectangle;
  o the ellipse using the auxiliary circles;
  o the ellipse in a rectangle;
  o the ellipse using the intersecting arc method, $PF_1 + PF_2 = V_1V_2$;
  o the hyperbola given the asymptotes and a point on it;
  o the hyperbola using the intersecting arc method, $PF_1 - PF_2 = V_1V_2$.
The hyperbola and the auxiliary circle. Knowing the directrices, finding the asymptotes and vice versa.
The centre of curvature at a point on the ellipse, parabola and hyperbola, the point not being a vertex.

2. Cycloidal curves

The construction of the cycloid, epicycloid, hypocycloid and their derived curves.
The tangent, normal and centre of curvature at a point on the cycloid and its trochoids.

3. Spiral curves

The Archimedean spiral: the drawing of one or more convolutions extending between two given radii; the tangent and normal at a point on it.

4. Helices and screw threads

The helix: right-hand and left-hand.
The true length of the helix.

The helix angle, excluding its application as being the true angle of the tangent drawn at any point on the helix.

Applications of the helix: the helical vane; round-, square- and rectangular-section springs; one- and two-start, internal or external, vee and square threads.

5.   Involute Spur Gears

The involute of a circle.

The analysis and drawing of gears in mesh. The number of teeth to be drawn in mesh shall be limited to five.

The construction of a gear tooth profile of an involute spur gear. Draw the tooth side using both the true involute method and approximate reproductive methods.

The rack and pinion.

6.   Coplanar loci of points on moving mechanisms.

Slider-crank mechanism.

Equal and unequal connected cranks.

Watt's straight-line motion.

Quick-return mechanism.

Geared link mechanisms.

The drawing of displacement diagrams related to the above.

7.   Cams

Types of motion: Dwell, Uniform Velocity (UV), Simple Harmonic Motion (SHM), Uniform Acceleration (UA), Uniform Retardation (UR), and Uniform Acceleration and Retardation (UAR).

Types of followers: knife-edged, flat-foot and roller-ended.

The line of action of the follower may be in-line or offset relative to the axis of the cam.

Types of cams: wedge, disc, cams with radial arm followers and end cams.

Problems will only be set to derive the cam profile from given cam and follower data.

8.   Projections

Isometric projection and the use of the isometric scale.

First and second auxiliary projection of shapes and solids.

9.   Projection of Lines

Lines inclined to the horizontal plane (H.P.) and the vertical plane (V.P.); the determination of their true lengths, their true inclination to the H.P. and the V.P.

Skew lines; the shortest distance between two skew lines; the bearing and slope of the shortest distance.

10.   Planes

Planes inclined to the horizontal plane (H.P.) and the vertical plane (V.P.); true angles between two planes: the dihedral angle.

The lines of intersection between two triangles or other plane laminae.

Oblique planes and their traces; the conversion of an oblique plane into a perpendicular inclined plane by means of auxiliary views; the true inclination to the horizontal and vertical planes determined using auxiliary projection or the technique of rabatment.

Lines, geometrical shapes and solids resting on, or cut by oblique planes.

11.   Intersection of Solids

Intersections of geometrical solids, between:
   a) two prisms;
   b) two cylinders;
   c) prism and cylinder;
   d) cone and prism/cylinder;
   e) pyramid and prism/cylinder;
   f) sphere/hemisphere and prism/cylinder;
   g) sphere and cone.

All solids are right, with the cones and pyramids standing on their bases.
Prisms and cylinders may be inclined to one plane of reference.
All above categories may include cases of offset middle planes.

The construction of the curve of intersection that results on:
   a) palm-ended rods and eccentric cylinders;
   b) rods of hexagonal section joined to cones or spheres.

12.   Solids in contact

Spheres in mutual contact with each other.
Spheres in contact with cones standing on their base.
The projection of the points of contact.

13.   Developments

The development of surfaces of right and oblique truncated prisms, cylinders, cones and pyramids.

Development by triangulation of transition pieces; the end connections may have different cross-sections, not necessarily parallel to each other.

14.   Graphical Statics

Coplanar concurrent and non-concurrent forces.
The use of Bow's notation, the polar diagram and the link polygon to determine graphically the resultant/equilibrant of a system of forces.

Shear Force and Bending Moment diagrams for:
a)   light cantilevers;

b)   light simply supported beams;
c)   light hinged beams - the beam is made of two parts, hinged together,
when these are subjected to vertical point loads and uniformly distributed loads (udl).

Framed structures; the use of space and force diagrams to framework problems to determine graphically the reactions and forces in members; the distinction between struts and ties. The applied external loading is limited to vertical point loads.

Paper II (max 100 marks)

Paper II will consist of four questions. The first is compulsory and carries 60% of the total marks. Candidates will choose two of the remaining three questions. These two questions share equally the remaining 40% of the marks.

Candidates will answer the questions on A2 drawing sheets, which will be provided.

It is of paramount importance that the candidates be able to interpret and produce engineering drawings to relevant British and equivalent ISO standards. The candidates should be familiar with the application of these standards, regarding them as reference documents.

Knowledge of the topics covered in Paper I is assumed. Paper II will cover the following topics:

1.   Layout and Presentation

Sheet layout of drawings to modern drawing office practice, including blocks for items such as title, date, drawing and job number, scales, materials and parts list, item (balloon) reference, material specification, treatment and finish and general tolerance. The sizes and types of drawing paper in use.
The layout and presentation of drawings should be in accordance with BS 8888 or the equivalent international ISO standard.

2.   Orthographic Projection

First and Third Angle projections with the use of hidden detail, sectional views and auxiliary views. Conventional practice as applied to sectional drawings. Symbols and abbreviations.

The production of assembly drawings from detail drawings of separate parts or vice versa. Although not limited to the following, the exercises may feature components of engines, compressors, pumps, non-return valves, safety valves and stop valves, couplings, simple clutches, bearings and shafting details.

3.   Dimensioning and tolerances

The dimensioning of drawings from centre and reference lines, machined and datum surfaces.

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Limits and fits; clearance, transition and interference fits.
The method of indicating tolerances for selected ISO fits using hole basis. Candidates should be able to read and apply Data Sheet 4500A, which will be provided if required.

Geometrical tolerances to BS EN ISO 1101 covering straightness, flatness, roundness, cylindricity, profile of a line, profile of a surface, parallelism, squareness, angularity, position, concentricity, symmetry, runout and total runout. Material conditions are excluded.

4.   Symbols

Machine and surface texture symbols to BS EN ISO 1302.
Welding symbols to BS EN 22553.
Types of welded joints: butt, fillet, edge and lap.

5.   Freehand sketches

Freehand sketching to extend knowledge and appreciation of :
   a) screw fasteners and screw threads;
   b) locking devices;
   c) keys, keyways and splines;
   d) shaft couplings;
   e) bearings;
   f) pistons, connecting rods and crankshafts;
   g) hole preparations: countersinks, counterbores and spotfaces.

The Computer-Aided Draughting (CAD) portfolio

1.   **General Guidelines**

a) CAD is an obligatory component. It carries 20% of the global mark.

b) The CAD component is continually assessed by the class tutor responsible for the subject.

c) Computer draughting assignments based on AutoCAD® up to 2D level will be covered during the 2 years duration of the course.

d) A portfolio shall be compiled by each candidate, and will contain hard copies (A3 size) of the assignments set by MATSEC and their computer generated solutions done by the candidate in class at fixed dates and times set by the MATSEC Board.

e) The candidates' portfolio with solutions marked by the tutor will be kept under strict confidential cover.

f) The three CAD assignments set by the class tutor shall be graded examples that progress with the knowledge gained both in the application of computer software and subject matter.

2.   **Aims and Objectives**

The course is aimed at providing course participants with the fundamentals of Computer-Aided Draughting (CAD) using AutoCAD® software packages to draw 2D plans and/or 2D projections. This course requires the candidate to:

a) demonstrate competency in using some of the standard available features of a CAD application;
b) to create and manipulate objects or elements and to modify objects or elements;
c) be able to change object properties;
d) be able to present a drawing in the orthographic and isometric systems of drawing;
e) undertake printing or plotting activity in colour/monochrome with specific scales.

3.   CAD Content

Assignment 1 places emphasis on correct coordinate input, precise length and orientation of entities, efficient methods and practices.

Assignment 1 carries a total of 5 marks.

It will comprise of the vector design of THREE RECOGNISED LOGOS, either individually chosen by candidate or set by lecturer as three class tasks.

Said logos will display basic knowhow to application of the following topics and AutoCAD® commands:

3.1.1   Open and close AutoCAD$^{®}$ application. Only one drawing will be required to be open at any given time;
3.1.2   Create a new drawing. Candidate should be able to start a new drawing using the standard metric template acadiso.dwt;
3.1.3   Set model environment i.e. units, limits etc;
3.1.4   Set interface settings e.g. snap, grid, ortho;
3.1.5   Use zooming tools;
3.1.6   Panning a drawing;
3.1.7   Understand & use Absolute and Relative Cartesian coordinate systems;
3.1.8   Drawing commands as Line, Circle, Arc;
3.1.9   Draw rectangle, polygon, ellipse;
3.1.10 Hatch a closed entity to represent sections;
3.1.11 Use snapping tools for accuracy;
3.1.12 Erase & oops;
3.1.13 Copy and Move objects;
3.1.14 Apply Chamfers and Fillets;
3.1.15 Trim operation;
3.1.16 Create and set text styles, using only default options;
3.1.17 Select plotter/ printer;
3.1.18 Plot all, part of drawing to a given scale from model space;
3.1.19 The Pline and Spline drawing commands;
3.1.20 The Rotate, Scale, Stretch, Extend & Offset modifying commands including precommand editing;
3.1.21 Mirror and array.
3.1.22 Add a new title block;

The logo designs should collectively show clear mastery of the basic commands mentioned. Marks will be allotted for research, proper adaptation, composition and presentation of work.

The final assignment should be printed and presented on a one-sided A3 sheet, bordered and labeled accordingly, as shown in Annex 1 - ASSIGNMENT 1: SPECIMEN. A marking scheme is found in Annex 2.

Assignment 2 places emphasis on the options available for the various drawing and editing commands that result in increased speed without loss of accuracy. The more advanced features of tracking, dynamic input, etc. are covered.

Assignment 2 carries a total of 5 marks.

It will comprise of the study and design of a small object (e.g. domestic appliance, electronic component, handheld tools).

The exercise will cover the topics and AutoCAD® commands listed below. Assignment 2 also assumes the content listed for Assignment 1.

3.2.1   Open multiple drawings and switch between them;
3.2.2   Create and save an AutoCAD drawing template;
3.2.3   Create named views & recall them;
3.2.4   Edit polylines and spline: decurve, fit, thickness, join and explode;
3.2.5   Break and Explode operations;
3.2.6   Create layers and assign properties such as line weights, line types, colour;
3.2.7   Set a layer current;
3.2.8   Modify status: On, Off, Freeze, Thaw, Lock, Unlock;
3.2.9   Modify layer attributes;
3.2.10 Create and set text styles with different fonts using all options;
3.2.11 Understand the difference between mtext and text commands;
3.2.12 Set a text style current;
3.2.13 Understand the text alignment abbreviations e.g. TR, TC, TL etc.;
3.2.14 Plot all, part of drawing from model space using all options.

The study of the small object should consist of:
- a freehand pictorial sketch of the small object;
- freehand orthographic views of your chosen object. Measure and include important dimensions in the sketch;
- orthographic views using ACAD;
- a titleblock.

The final assignment should be printed and presented on a one-sided A3 sheet, bordered and labeled accordingly, as shown in the annexed Annex 2 - ASSIGNMENT 2: SPECIMEN. A marking scheme is found in Annex 4.

Assignment 3 places emphasis on manipulation of different layouts that include viewports with different scales, dimensions, isometric and other annotations.

Assignment 3 carries a total of 10 marks.

A pictorial view of a chosen mechanical component is suggested to be used to cover the topics listed below.

Assignment 3 assumes knowledge of both assignment 1 and 2. The exercise will cover the topics listed below.

3.3.1   Understand the difference between Model and Paper space;
3.3.2   Add a new title block;
3.3.3   Changing to isometric mode;
3.3.4   Toggle between isoplanes (top, right & left views), isometric ellipses, isometric fillets, and writing (text) in isometric mode;
3.3.5   Create a block from a previously drawn object consisting of multiple entities;
3.3.6   Save a created block independently of the drawing for use within a different drawing;
3.3.7   Insert a block into a drawing from within the original drawing and from external source;
3.3.8   Convert an inserted block back into its original constituent parts;
3.3.9   Create and set dimension style according to ISO standard;
3.3.10 Set a dimension style current;
3.3.11 Create an override within a dimension style;
3.3.12 Set up a drawing space in order to layout a drawing ready for printing;
3.3.13 Create a number of different drawing space layouts, to illustrate different parts of the drawing;
3.3.14 Toggle between different types of space in order to make alterations to a drawing, as appropriate;
3.3.15 Apply a range of standard scales to different viewports which when printed can be measured;
3.3.16 Plotting using all options, including printing from layouts;
3.3.17 Converting files to pdf.

The final layouts should be printed and presented on A3 sheets. An appropriate labelled border should be included in all layouts, as shown in the annexed Annex 3 - ASSIGNMENT 3: SPECIMEN. A marking scheme is found in Annex 6.

Practical Exercises

The three CAD assignments set by MATSEC and answered by candidates during the tests will be progressively stored on a CD which will be kept under confidential cover. Candidates will only have access to this CD during the fixed date and time of the CAD assignments set by the MATSEC Board.

Reading list

Eanna O Broin   **Technical Draughtmanship**   ISBN: 9780717116522
Colin H Simmons et al   **Manual of Engineering Drawing**   ISBN: 9780080966526
Edward Jackson   **Advanced Level Technical Drawing**   ISBN: 9780582355255
Francis X Dalli   **Graphical Statics**   ISBN: 9789995702311
Paul Green   **The Geometrical Tolerance Desk Reference**   ISBN: 9780750668217
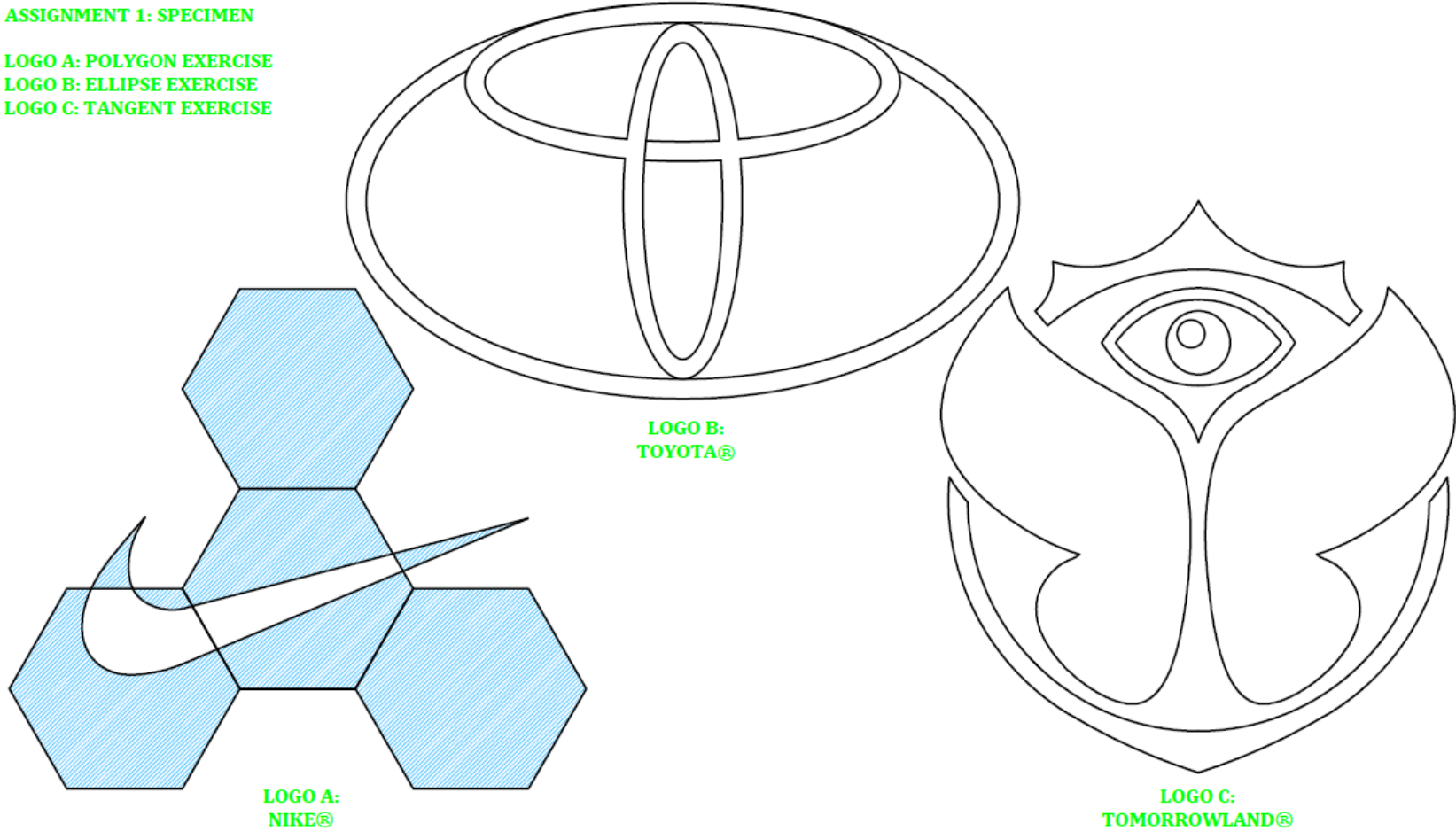
Annex 1

ASSIGNMENT 1: SPECIMEN

ASSIGNMENT 1: SPECIMEN

LOGO A: POLYGON EXERCISE
LOGO B: ELLIPSE EXERCISE
LOGO C: TANGENT EXERCISE

LOGO B:
TOYOTA®

LOGO A:
NIKE®

LOGO C:
TOMORROWLAND®

Scale: 1:1	Drawn by: NAME	Drawing title: ASSIGNMENT 1: SPECIMEN	GROUP	
	Date: XX/ XX/ XX			

Annex 2

Marking scheme is out of 100%.

Task 1		Mark
3.1.1	Complied Research/ Sketches (1 to 3 Sheets)	5
3.1.2	Running AutoCAD®, Model Environment and Interface Setting set-up	5
3.1.3	Basic Drawing Commands: Line, Circle, Arc, Rectangle, Polygon, Ellipse	10
3.1.4	Basic Modifying Commands: Erase, Copy, Move, Trim, Rotate, Scale, Stretch, Extend, Offset	5
3.1.5	Applied Drawing Commands: Pline, Spline, Hatching	5
3.1.6	Applied Modifying Commands: Chamfers, Fillets, Mirror, Array	5
3.1.7	Text and Text Styles	5
3.1.8	Title-Block and Border	5
3.1.9	Technique, Composition and Presentation of Logo A	15
3.1.10	Technique, Composition and Presentation of Logo B	15
3.1.11	Technique, Composition and Presentation of Logo C	15
3.1.12	Plotting/ Printing	5
3.1.13	Overall Presentation and Composition of Assignment	5

Annex 3

ASSIGNMENT 2: SPECIMEN
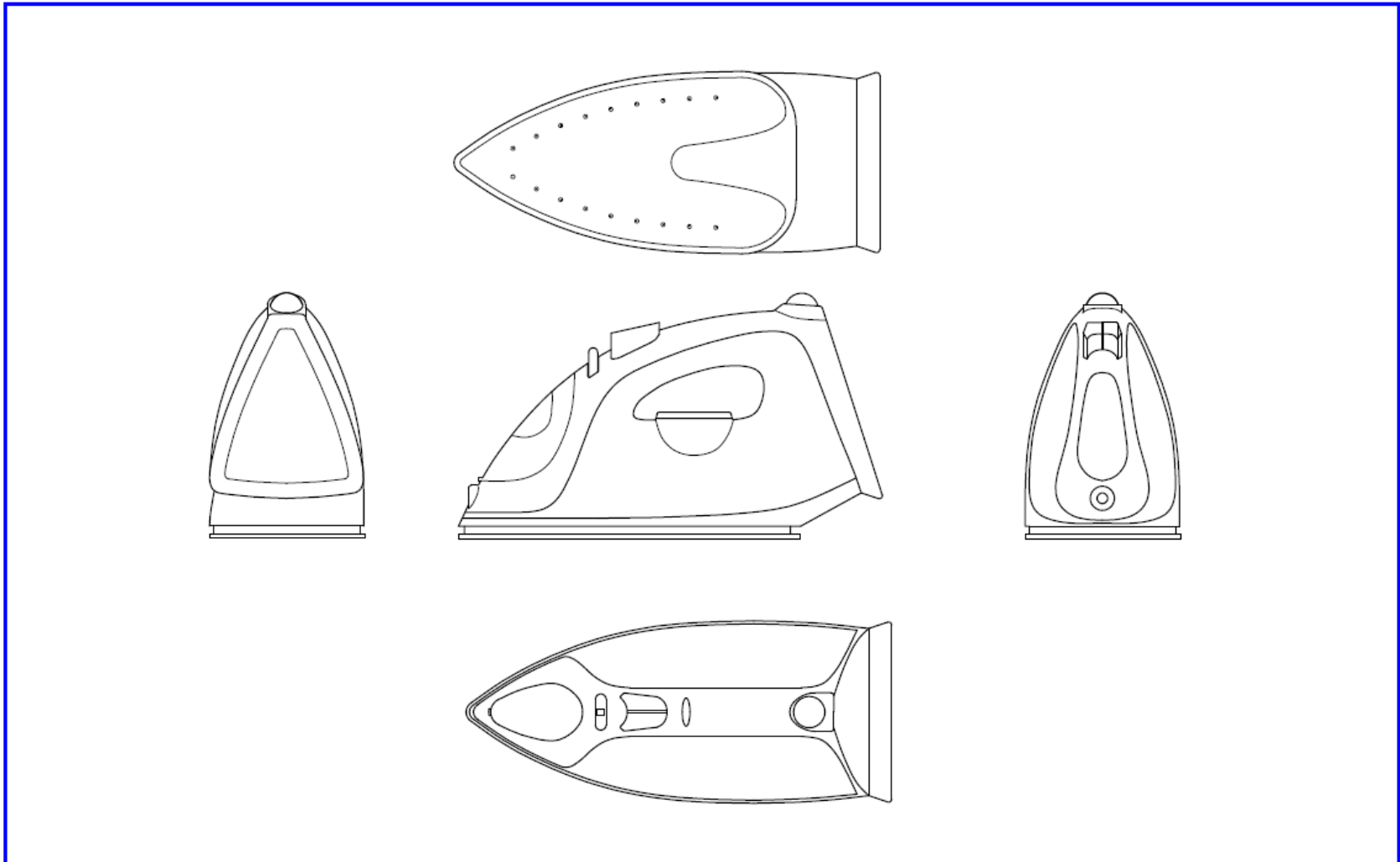
Scale:	Drawn by:		Drawing title:		
1:3	NAME		CAD ANNUAL EXAM		
	Date:				
	JUNE 2019				

Annex 4

Marking scheme is out of 100%.

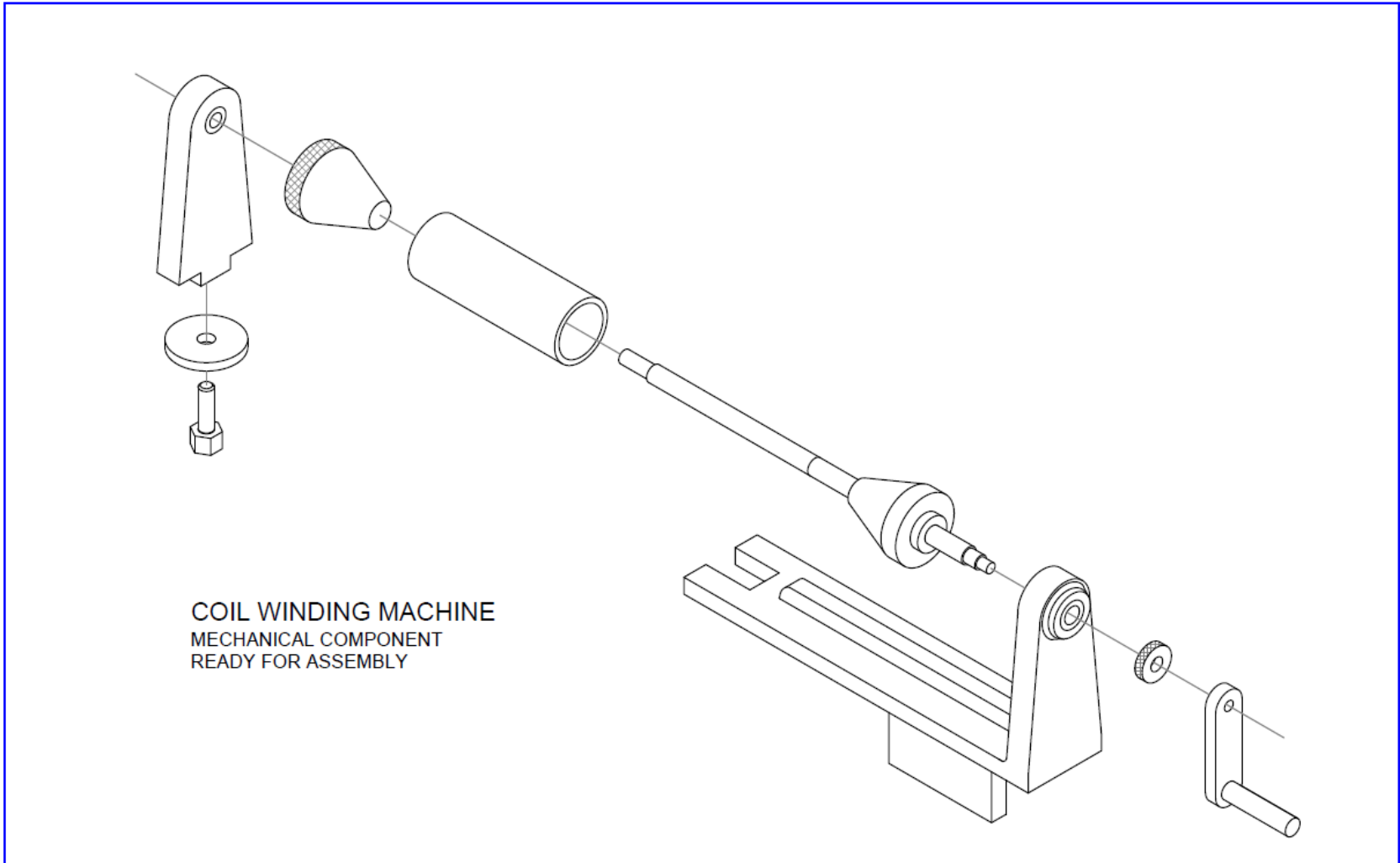| Task 2			Mark
		Draw a freehand sketch of the object studied	8
		Draw freehand orthographic views of the object	8
		Include important dimensions in the orthographic views	4
	3.2.1	Open multiple drawings and switch between them	5
	3.2.2	Create and save an AutoCAD drawing template	5
	3.2.3	Create named views & recall them	7
	3.2.4	Edit polylines and spline: decurve, fit, thickness, join and explode	6
	3.2.5	Break and Explode operations	5
	3.2.6	Create layers and assign properties such as line weights, line types, colour	10
	3.2.7	Set a layer current	4
	3.2.8	Modify status: On, Off, Freeze, Thaw, Lock, Unlock	6
	3.2.9	Modify layer attributes	4
	3.2.10	Create and set text styles with different fonts using all options	10
	3.2.11	Understand the difference between mtext and text commands	5
	3.2.12	Set a text style current	3
	3.2.13	Understand the text alignment abbreviations e.g. TR, TC, TL etc.;	5
	3.2.14	Plot all, part of drawing from model space using all options	5

Annex 5

ASSIGNMENT 3: SPECIMEN

SECTION Y - Y

SECTION X - X

Scale:	Drawn by:	Drawing title:	
1:1	NAME	CAD PROJECT 3.1	
	Date:		

COIL FORMER LOCKING NUT

COIL FORMER

SPINDLE

SPINDLE LOCKING NUT

SPINDLE HANDLE

END BEARING

WASHER

BODY (SIDE VIEW)

BODY (FRONT VIEW)

BRONZE BUSH
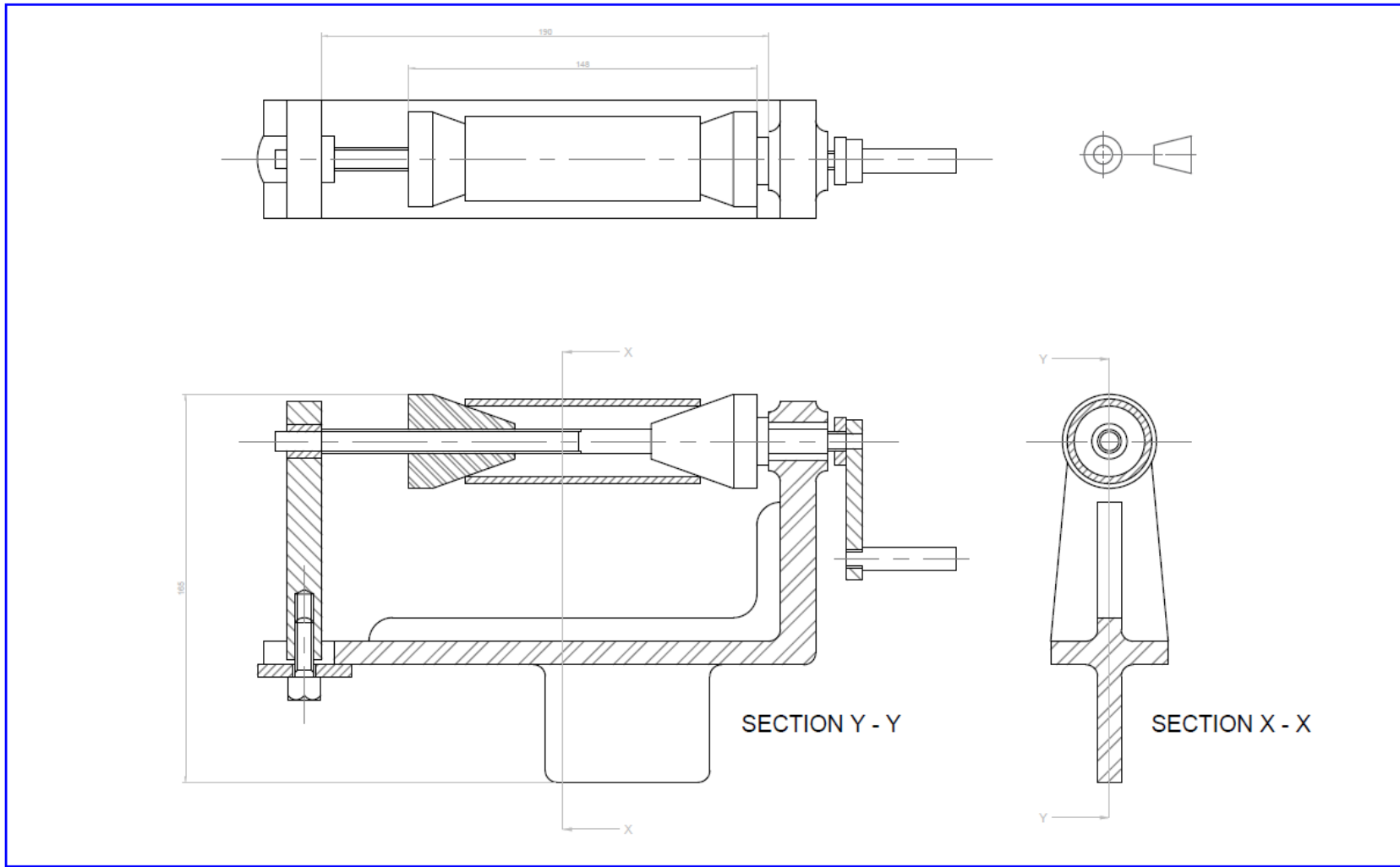
Scale: 1:1	Drawn by: NAME	Drawing title: CAD PROJECT 3.2	
	Date:		

COIL WINDING MACHINE
MECHANICAL COMPONENT
READY FOR ASSEMBLY

Scale:		Drawn by:		Drawing title:	
1:1			NAME	**CAD PROJECT 3.3**	
		Date:			

Annex 6

Marking scheme is out of 100%.

Task 3		Mark
3.3.1	The difference between Model and Paper space and add a new title block	10
3.3.2	Change to isometric mode, toggle between isoplanes (top, right and left views), isometric circles, fillets and text in isometric mode	10
3.3.3	Create a block from a previously drawn object consisting of multiple entities and save a created block independently of the drawing for use within a different drawing	5
3.3.4	Insert a block into a drawing from within the original drawing and from external source and Convert an inserted block back into its original constituent parts	5
3.3.5	Create and set dimension style according to ISO standard, set a dimension style current and create an override within a dimension style	5
3.3.6	Draw in either First or Third Angle Projection a section view of a mechanical component	10
3.3.7	Draw a pictorial view with corresponding detail of a chosen mechanical Component	10
3.3.8	Draw an Isometric View of the chosen mechanincal component	10
3.3.9	Set up a drawing space in order to layout a drawing ready for printing	10
3.3.10	Create a number of different drawing space layouts, to illustrate different parts of the drawing	10
3.3.11	Toggle between different types of space in order to make alterations to a drawing, as appropriate	5
3.3.12	Apply a range of standard scales to different viewports which when printed can be measured	5
3.3.13	Plotting using all options, including printing from layouts and Converting files to pdf.	5