# GRAPHICAL COMMUNICATION 

## SYLLABUS <br> FORM 1 - FORM 5

The Syllabus has been drawn within the parameters of the S.E.C. 29 Syllabus for Graphical Communication 2008-2010. It would be advisable to check the S.E.C. syllabus at the beginning of each year and include any revisions, which may have taken place.

Hereunder is the amended Graphical Communication Syllabus as agreed to by the subject teachers who attended the in-service course held in September 2006.

This syllabus, which is to be used in both the Junior Lyceums and Area Secondary Schools, reflects the new S.E.C. Examination for 2009-2010. Provisions for students who choose the subject in the third year as an option are being included.

## C. SPITERI

Education officer Design and Technology

## AIMS AND OBJECTIVES

Amongst other aims the syllabus should:

- Contribute to the pupil's personal development and overall education.
- Develop the pupil's ability to interpret, reason and communicate graphically.
- Stimulate an interest in and enjoyment of the study of graphical techniques and their application.

Throughout the course the student is expected to be able to demonstrate

- Knowledge
- Comprehension
- Application
- Analysis
- Technique.


## Knowledge of:

- Drawing equipment
- Constructions, terminology and conventions applicable to the subject.
- Principles of orthographic and pictorial projections.


## Comprehension:

- Interpretation of the information given (verbally, in written form, graphically, or a combination of two or more), so as to represent design concepts.
- Consideration and representation of plane and solid shapes.
- Understanding and visualizing spatial relationships.


## Application:

- Production of suitable drawings from information given.
- Application of the principles of plane and solid geometry to the solution of problems.
- Application of the principles of orthographic and pictorial projection.


## Analysis:

- Comparison and use of the appropriate graphical methods of communicating information and ideas.
- Analysis of and solutions to a problem graphically.


## Technique:

- Accuracy in questions answered.
- Ability to sketch freehand and in good proportions.
- Presentation of good draughtsmanship (presentation, cleanliness, finishing, spacing etc.)
- Use of available aids and media to enhance the presentation where appropriate.

Note:
Neatness, presentation and accuracy should be stressed regularly throughout the whole course. Technical terms and details should be used when encountered

## FORM 1

## 1 THE EQUIPMENT:

1.1 Pencils
1.2 Erasers

### 1.3 Rulers

1.4 Paper
1.5 Drawing boards

### 1.6 Board clips

1.7 Tee-squares
1.8 Set squares

Types of pencils - common and clutch. Codes used on pencils (6H----H HB B---6B). Pencils used in the subject. Sharpening of pencils: pencil point should always be sharp for accuracy, neatness and presentation.

Types of. Synthetic and natural rubber. Soft and hard.

Common types: wooden, plastic (metal should not be used). Attention when measuring to avoid errors.

Types of. Grading by weight and surface finish. Common metric sizes, A sizes.

Types of boards: wooden or plastic used by students, and drafting machines and plotters used in drawing offices. Sizes.

Their use and alternatives. Drafting tape or sellotape, pins, other fasteners.

Wooden or plastic. Fixed or adjustable. Sizes

Types of Material-sizes-names (30 $0 / 60^{\circ}$ and 45 ). Safe use. Students should be taught how to handle and use the setsquares and how to draw angles with one or two setsquares ( $30^{\circ}$ and $45^{\circ}=75^{\circ}$ ).

| 1.9 The protractor | Proper use of. Inside and outside reading. Right- <br> handed and left-handed reading. Reading of angles <br> on perpendicular, vertical and inclined bases. |
| :--- | :--- |
| 1.10 Compasses | Types: spring, small, wheel operated, etc. Emphasis <br> on having good quality instruments. Two compasses, <br> one for small circles, should be encouraged. Safe <br> use of these instruments. |
| 1.11 Dividers | Use of. Safe and proper handling of. |
| Drawing aids: French curves, flexi curve, radius <br> curves, templates, others. These should not be <br> encouraged at this stage but should be mentioned as <br> general knowledge. They can be used later on after |  |
| acquiring drafting skills. |  |

## 2 DRAWING TECHNIQUES:

### 2.1 Lines

Types of. Outlines - bold and dark - H or HB pencil. Construction / projection / dimension lines - thin and faint (feint) - 2 H pencil. Emphasis on difference. The other types of lines should be dealt with as they come along.

### 2.2 Borders

Borderlines and title block/panel. All necessary information to be included when appropriate: name, class date, drawing number, scale and projection.

| 2.3 Lettering | Simple block lettering. Freehand and between <br> guidelines for uniformity (note that 3 mm to 5 mm is <br> the ideal height). Lettering should be checked <br> regularly. Stencils or dry transfers should not be <br> encouraged. |
| :--- | :--- |
| 2.4 Measuring out | Proper method of measuring out with the use of <br> dividers and ruler. Direct transfer of measurement <br> from the ruler to the drawing should be discouraged. |

## 3 GEOMETRICAL CONSTRUCTION:

3.1 Bisection Bisection of horizontal, vertical and inclined lines using the compasses. Multiple bisections 4, 8 etc. Attention should be drawn to the fact that a perpendicular $\left(90^{\circ}\right)$ is produced.

### 3.2 Perpendiculars

### 3.3 Division of lines

Division of a line into a number of equal parts. Use of set squares, compasses and dividers. Accuracy should be emphasized. Practising of parallel lines with the use of set squares.

### 3.4 Angles

### 3.5 Triangles

3.6 Quadrilaterals

Right angle, acute, obtuse and reflex. Construction of angles with the use of set squares $\left(30^{\circ}+45^{\circ}=75^{\circ}\right)$, protractor and/or compasses. Bisection of angles by means of set squares and compasses.

Types of triangles: right angled, obtuse angled, acute angled, equilateral, isosceles, scalene. Technical names: vertex, base, altitude. Properties of triangles: triangles in a semicircle, triangles between parallels.
Construction of triangles from given data:

- 3 sides
- 2 sides and their included angle
- Base, one base angle and the length of the side opposite the base angle
- Base and the 2 base angles
- The base of an equilateral triangle
- The altitude of an equilateral triangle
- Base and altitude of an isosceles triangle
- Length of one side/angle and hypotenuse of a right angle triangle

Types of: square, rectangle, parallelogram, rhombus, trapezium, kite, etc. Their properties. Their construction.
3.7 The circle

Parts of the circle: circumference, radius, sector, quadrant, diameter, centre, segment, chord, arc, semicircle, etc.

| 3.8 Polygons | Pentagon, hexagon, heptagon, octagon and nonagon. Regular and irregular. Properties of regular polygons. Their construction by protractor angles (less the Heptagon). |
| :---: | :---: |
| 3.9 The hexagon | Construction: by means of Set squares and Tee square. Inscribed in a circle using the compasses; Inscribed in a circle using the $60^{\circ}$ set square. Circumscribed around a circle using the set squares, etc. |
| 3.10 The octagon | Construction of the octagon in a circle and in a square. |
| 3.11 The Pentagon | Construction of the pentagon by means of the protractor. |
| 3.12 Application | Application of the above geometrical constructions in practical examples. |
| 4 PICTORIAL PROJECTION: |  |
| 4.1 Isometric | Simple blocks such as cubes, rectangular and stepped blocks, etc. Vertical and horizontal lines only and from pictorial to isometric. Isometric paper can be used. |

## 5 IDEOGRAMS:

### 5.1 Ideograms

Introduction to 'information graphics' -
Safety signs - Introduction to shading and colours including general information and warning signs.

## FORM 2

Revision of Form 1 Syllabus. Problems and exercises.

## 1 GEOMETRICAL CONSTRUCTION:

1.1 Division of lines Division of straight lines into a given ratio.

### 1.2 Triangles

1.3 Polygons
1.4 The circle

### 1.5 Application

Construction of triangles from given data:

- 2 base angles and the altitude
- Altitude and apex angle of an isosceles triangle.

Construction of regular polygons in a given circle. Construction of regular polygons on a given line (one side given).

Parts of the circle. Problems related to the circle. Finding the centre of a circle. Circles inscribed in triangles, squares and polygons. Circumscribed circles. Escribed circles.

Application of the above geometric constructions in practical examples.

## 2 ORTHOGRAPHIC PROJECTION:

2.1 Orth. Proj.

Introduction to orthographic projection. 1st angle projection with straight lines only and including vertical, horizontal and inclined lines. End elevation to be drawn on either side of the front elevation (also drawn on both sides of the front).

Specimen example of a Title/Name Block - annex A.

| 2.2 Hidden lines | Blocks with hidden edges (dotted lines), drawn <br> according to the B.S. - slots and square / rectangular <br> holes. |
| :--- | :--- |
| 2.3 Free-hand | Free-hand sketches of elevations on squared (grid) <br> paper. Several examples could be given where two |
|  | views are given and the third is to be added. |
| Enlargement of figures / drawings using grids. |  |

## 3 PICTORIAL PROJECTION:

3.1 Isometric Projection Straight lines including vertical, horizontal and inclined. To be drawn from given isometric, oblique and simple orthographic views.

### 3.2 Oblique Projection <br> Introduction. (Similar to 3.1) To be in CABINET form with the 3rd axis at $45^{\circ}$ and half- true length. CAVALIER oblique to be mentioned as general knowledge only.

## 4 SOLID GEOMETRY:

### 4.1 Prisms

Square, hexagonal, octagonal, triangular and rectangular. Three elevations and development of mentioned prisms without truncations. Fold lines.

### 4.2 Pyramids

As 4.1, but using examples of pyramids with true length in elevation.

## 5 IDEOGRAMS:

### 5.1 Ideograms <br> Introduction to 'information graphics'.

Safety signs - Introduction to shading and colours including Prohibition, Mandatory and Safe Condition signs.

Preliminary sketches of different ideas, with emphasis on presentation, colouring and shading.

List of safety signs - annex B.

Note: As you are aware students may opt to start Graphical Communication in Form Three with the programme being covered in 3 years and in separate classes as is being done in the case of foreign languages.

See appendix 1 at the end of syllabus.

Revision of Form 1and 2 syllabii. Problems and exercises.

## 1 GEOMETRICAL CONSTRUCTION:

1.1 The circle $\quad$| Circles touching; two and three circles touching; |
| :--- |
| internal and external; tangential arcs. |

### 1.2 Triangles

Construction of triangles from given data:

- Perimeter and the ratio of the 3 sides
- Perimeter and altitude of an isosceles triangle
- Perimeter and the 2 base angles
- Perimeter, base and base angle
- Base angle, apex angle and altitude


#### Abstract

1.3 Tangents

To a point on the circumference. From a point outside the circle. Tangents to equal and unequal circles (external and internal tangents).

\subsection*{1.4 Polygons}

General revision. Regular and irregular polygons drawn from given data.

\subsection*{1.5 Division of lines}

Proportional division of lines. Its application in drawing figures (e.g. Triangle with sides 2:4:5perimeter 200), etc.


1.6 Enlargement | Linear enlargement and reduction of regular or |
| :--- |
| irregular figures with straight lines only. Use of radial |
| method to a given measurement or ratio (see 1.4). |

### 1.7 The ellipse

Construction of the ellipse. Five methods: Auxiliary circles or Concentric circles, Trammel, Intersecting lines or Rectangle, Intersecting arcs or Foci or Radial interceptors and Compasses or Approximate. Construction of circles and lines tangential to the ellipse.

## 2 ORTHOGRAPHIC PROJECTION:

### 2.1 Orthog. Proj

Further exercises regarding blocks with straight lines only and including horizontal, vertical and inclined lines/slopes, webs, ribs, etc. Blocks with hidden edges and with square or rectangular holes. Introducing curved lines, holes and centerlines. Introducing 3rd angle orthographic projection. Both projections should be used regularly.
Introducing the projection of the third view from the given two elevations.

### 2.2 Sectioning <br> Introducing simple whole sectioning. Section lines at $45^{\circ}$ and equally spaced.

## 3 SOLID GEOMETRY:

3.1 Prisms
3.2 The Cylinder
3.3 Pyramids

Square, rectangular, hexagonal, etc. truncated at different angles - including elevations, true shape of section and development. Truncation may be sectioned.

Truncated at different angles and as 3.1

Square, rectangular, hexagonal, etc. truncated at different angles - including elevations, true shape of section and development. Introducing true lengths.

### 3.4 The Cone

3.5 Inclined

Prisms and cylinders standing inclined at an angle to one of the principal planes - to project the other two elevations

## 4 PICTORIAL PROJECTION:

4.1 Isometric

Construction of isometric projections including circles and arcs by the use of a grid, ordinates and approximate (compasses) method.
4.2 Oblique

Cabinet with straight and curved lines

## 5 GRAPHICS

### 5.1 Logos

Introduction to the three types of Logos:
Monogram (letters), Design, and Combination of Monograms and Designs.
5.2 Ideograms

Harder examples and exercises

### 5.3 Graphs

Introduction to. Line, bar, pie, block, pictographs, percentage bar, etc. Keys / Legends and colour coding.

## FORM 4

Revision - problems and exercises. Emphasis on time management.

1 GEOMETRICAL CONSTRUCTION:
1.1 Enlargement Linear enlargement and reduction of figures having straight and curved lines. Different methods to be used - radial, pole, proportional and grids.
1.2 Areas

Conversion of areas. Polygon to quadrilateral, triangle, rectangle, square. Rectangle to rectangle. Rectangle to square, etc.

1.2 Areas | Determination of areas of regular or irregular figures |
| :--- |
| bound by straight and curved lines. Both squares |
| and parts of and mid-ordinate methods are to be |

### 1.3 Loci

| 1.4 Helix | To cover simple line helices with one or more |
| :--- | :--- |
| revolutions. Its application. Springs (circular, |  |
|  | rectangular or square). Handrails, etc. (threads not |
|  | considered.) |

1.5 Scales

Simple or plain scale and its application

## 2 SOLID GEOMETRY:

| 2.1 Conic sections | The ellipse, the parabola and the hyperbola as conic |
| :--- | :--- |
| sections and using the radial and sections method. |  |
|  | Developments - radial method. |
|  | Projection of elevations from given <br> developments. |

2.2 Inclined

See Form 3: 3.5.

## 3 ORTHOGRAPHIC PROJECTION:

| 3.1 Assembly | Orthographic projection of assembled components from: in-line exploded pictorial projection, from orthographic views, and combination of. |
| :---: | :---: |
| 3.2 Sectioning | Whole, half, part, staggered, removed, revolved. |
| 3.3 Webs / Ribs | Parts and features of parts not normally sectioned. (i.e. Longitudinal cutting planes). <br> Webs, ribs, spokes, shafts and similar parts, cut /sectioned along their axis are not to be shown in section. <br> Parts and features of parts normally sectioned. (i.e. transversal cutting planes). Webs, ribs spokes, shafts, tubes and similar parts cut/sectioned across their axis are to be shown in section. |

### 3.4 Conventions <br> Simple B.S. drawing conventions to represent components in engineering drawing and including dimensioning. Refer to PP 8888. <br> List of Conventions - annex C.

| 3.5 Free hand | Freehand sketching of orthographic views, with <br> straight and curved lines, in good proportion. |
| :--- | :--- |
| 4 PICTORIAL PROJECTION: |  |
| 4.1 Planometric | Introduction to planometric projection. Horizontal axis <br> of the object to be $45^{\circ} / 45^{\circ}$ or $60^{\circ} / 30^{\circ}$. In the case <br> of $45^{\circ} / 45^{\circ}$ the height may be reduced depending on <br> height of object. Including straight and curved lines. <br> Introduction to perspective projection. Estimated <br> only. Single-point and two points perspective. <br> Shading. <br> Worked example of a two point Perspective view - annex D |
| 4.3 Free hand | Freehand sketching of pictorial views with straight <br> and curved lines in good proportion and either <br> shaded or unshaded. |

## 5 GRAPHICS :

### 5.1 Ideograms

### 5.2 Logos

Harder examples. Past papers

Harder examples. Past papers

### 5.3 Electricity

### 5.4 Graphs

### 5.5 Flow Charts

Simple flow charts of practical nature with symbols for Terminals, Processes, Inputs / Outputs, Decisions and Connectors.

### 5.6 Computer Graphics The use of computer as an aid to draughting.

To follow a sequence of computer commands for creating graphic images on a pre-printed grid and draw images produced by a given programme.

Specimen question/answer - annex F.
$\begin{array}{ll}\text { 5.7 Design. } & \text { Design in relation to graphical presentation. To find } \\ \text { and draw a solution to a given simple problem in } \\ \text { design. See specimen paper S. E. C. } 2002-2005 \\ \text { syllabus. }\end{array}$

## FORM 5

Revision as in previous years with emphasis on time management.

## 1 GEOMETRICAL CONSTRUCTIONS:

1.1 Scales $\quad$| Revision of the simple scale and introduction to |
| :--- |
| diagonal scales. |

1.2 Vectors

Simple vectors. Triangle and polygon of forces. Coplaner and concurrent only.

## 2 SOLID GEOMETRY:

### 2.1 Interpenetration

Interpenetration of solids. Lines of intersections, between prisms and cylinders, equal and unequal in diameter. Interpenetrations to be restricted to solids whose axes are perpendicular. These axes may either lie in the same vertical plane or offset, but always parallel to the vertical plane. Developments.

## 3 ORTHOGRAPHIC PROJECTION:

### 3.1 Auxiliary

### 3.2 Lines

Auxiliary views of simple objects. Auxiliary plan and auxiliary elevation. Given auxiliary elevation and plan to draw the front and side elevations.

Lines in space. Finding their true length by rotation or auxiliary projection. Lines to be drawn in isometric in relation to the vertical and horizontal planes.

## 4 GRAPHICS:

4.1 Ideograms
Harder examples. Past papers.

### 4.2 Logos

Harder examples. Past papers.
4.3 Electricity Harder examples. Past papers.
4.4 Computer Graphics Harder examples.
4.5 Charts Sequence of work. (as in Do-it-Yourself Kits)
4.6 Design See Form $4: 5.7$.

Revision of work through past papers with emphasis on accuracy, presentation and time management.

## APPENDIX 1

## GRAPHICAL COMMUNICATION - Taken as a third-year option.

## FORM 3 year 1

## 1 THE EQUIPMENT:

| 1.1 Pencils | Types of pencils, common and clutch. Codes used <br> on pencils $(6 \mathrm{H}---\mathrm{H} \mathrm{HB} \mathrm{B}--6 \mathrm{~B})$. Pencils used in the |
| :--- | :--- |
| subject. Sharpening of pencils. Pencil point should |  |
| always be sharp for accuracy, neatness and |  |
| presentation. |  |

1.2 Erasers $\quad$| Types of. Synthetic and natural rubber, soft and |
| :--- |
| hard. |

| 1.3 Rulers | Common types: wooden, plastic (metal should not be <br> used). Attention when measuring to avoid errors. |
| :--- | :--- |
| 1.4 Paper | Types of: Grading by weight and surface finish. <br> Common metric sizes: A sizes. |

1.5 Drawing boards
1.6 Board clips
1.7 Tee-square

Types of boards: wooden or plastic used by students and drafting machines used in drawing offices. Sizes.

Their use and alternatives. Drafting tape or sellotape, pins, other fasteners.

Wooden or plastic. Fixed or adjustable. Sizes.

| 1.8 Set squares | Types of. Material - sizes - names (30ㅇ/60 and $45^{\circ}$ ). Safe use. Students should be taught how to handle and use the set squares. How to draw angles with one or two set squares ( $30^{\circ}$ and $45^{\circ}$ $=75^{\circ}$ ). |
| :---: | :---: |
| 1.9 The protractor | Proper use of. Inside and outside reading. Rightand left-handed reading. Reading of angles on perpendicular, vertical and inclined bases. |
| 1.10 Compasses | Types: Spring, small, wheel operated, etc. Emphasis on having good quality instruments. Two compasses with one for small circles, should be encouraged. Safe use of these instruments. |
| 1.11 Dividers | Use of. Safe and proper handling of. |
| 1.12 Other equipment | Drawing aids: French curves, flexi curve, radius curves, templates, others. They should not be encouraged at this stage - should be mentioned for general knowledge - can be used later on after acquiring drafting skills. |
| 2 DRAWING TECH |  |
| 2.1 Lines | Types of: Outlines - bold and dark - H pencil or an HB. Construction / projection / dimension lines - thin and faint (feint)-2H pencil. Emphasis on difference. The other types of lines will be dealt with as they come along. |

2.2 Borders | Borderlines and title block / panel. All necessary |
| :--- |
| information to be included when appropriate: |
| Name, class date, drawing number, scale and |
| projection. |

### 2.3 Lettering

### 2.4 Measuring out

Simple block lettering. Freehand and between guidelines for uniformity (note that 3 mm to 5 mm is ideal height). Lettering should be checked regularly. Do not encourage stencils or dry transfers.

Proper method of measuring out with the use of the dividers and ruler. Discourage direct transfer of measurement from the ruler to the drawing.

## 3 GEOMETRICAL CONSTRUCTION:

### 3.1 Bisection.

Bisection of horizontal, vertical and inclined lines using the compasses. Multiple bisections: 4, 8, etc. Attention should be drawn to the fact that a perpendicular ( $90^{\circ}$ ) is produced.

### 3.2 Perpendiculars

Erection from a central point on a line. Erection from a point near the edge of a line. Dropping a perpendicular from a point above the line Erection of a perpendicular to one end of the line. The line can be in a vertical, horizontal or inclined position.

### 3.3 Division of lines

Divide a line into a number of equal parts. Use of set squares, compasses and dividers. Accuracy emphasized. Practising parallel lines with the use of set squares. Division of straight lines to a given ratio. Its application in drawing figures.

| 3.4 Angles | Right angle, acute, obtuse and reflex. Construction of angles with the use of set squares ( $30^{\circ}+45^{\circ}=$ 75ㅇ) protractor and/or compasses. Bisection of angles by means of set squares and compasses. |
| :---: | :---: |
| 3.5 Triangles | Types of triangles: right angled, obtuse angled, acute angled, equilateral, isosceles, scalene. Technical names: vertex, base, altitude. Properties of triangles: triangles in a semicircle, triangles between parallels. Construction of triangles from given data. |
| 3.6 Quadrilaterals | Types of: square, rectangle, parallelogram, rhombus, trapezium, kite, etc. Their properties. Their construction. |
| 3.7 Polygons | Pentagon, hexagon, heptagon and octagon. Regular and irregular. Properties of regular polygons. Their construction by protractor angles. |
| 3.8 The Octagon | Its construction in a circle and in a square. |
| 3.9 The Hexagon | Construction by means of: Set squares and Tee square: Inscribed in a circle using the compasses: Inscribed in a circle using the $60^{\circ}$ set square. Circumscribed around a circle using the set squares, etc. |
| 3.10 The Pentagon | Construction of the pentagon and heptagon by means of the protractor. |
| 3.11 Polygons | Construction of regular polygons in a given circle. Construction of regular polygons on a given line (one side given). |


| 3.12 The Circle | Parts of the circle: circumference, radius, sector, |
| :--- | :--- |
| quadrant, diameter, centre, segment, chord, arc, |  |
| semi circle, etc. Problems related to the circle. |  |
|  | Finding the centre of a circle. Circles inscribed in |
| triangles, squares and polygons. Circumscribed |  |
| circles. Escribed circles. |  |
| Tangents: To a point on the circumference. From a |  |
| point outside the circle. Tangents to equal and |  |
| unequal circles (external and internal tangents). |  |
| Circles touching: two or more circles touching |  |
| internally / externally and their combination |  |
| tangential arcs. |  | practical examples.

## 4 ORTHOGRAPHIC PROJECTION:

### 4.1 Orth. Proj.

Introduction to orthographic projection. 1st angle and 3rd angle orthographic projection. Both projections should be used regularly. Projection with straight lines and including vertical, horizontal and inclined lines. End elevation to be drawn on either side of the front elevation (can also be drawn on both sides of the front).

| 4.2 Hidden details | Blocks with hidden edges (dotted lines) drawn <br> according to the B.S., slots and square/rectangular <br> holes. Introducing curved lines, holes and <br> centrelines. <br> Introducing simple whole sectioning. Section lines at <br> 4.3 Sectioning and equally spaced. <br> Specimen example of a Name/Title Block - annex $A$. |
| :--- | :--- |
| 4.4 Free-hand | Free-hand sketches of elevations on squared (grid) <br> paper. Several examples can be given where two <br> views are given and the third is to be added. <br> Enlargement of figures / drawings using grids. |

## 5 SOLID GEOMETRY:

### 5.1 Prisms

### 5.2 The Cylinder

### 5.3 Pyramids

Square, rectangular, hexagonal, etc. truncated at different angles and including: elevations, true shape of section and development. Introducing true lengths.

### 5.4 The Cone

Truncated at different angles and as in 5.3.

### 5.5 Inclined <br> Prisms and cylinders standing inclined at an angle to one of the principal planes. To project side elevation and plan.

## 6 PICTORIAL PROJECTION:

### 6.1 Isometric Projection

### 6.2 Oblique Projection

Introduction. Straight lines, including vertical, horizontal and inclined. To be drawn from given isometric, oblique and simple orthographic views.

Curved lines including circles, arcs and cylinders.
Use of grid, ordinates and approximate (compasses) method

Introduction. Similar to 6.1. To be in CABINET form with the 3rd axis at $45^{\circ}$ and half true length. CAVALIER oblique to be mentioned for general knowledge only.

FORM 4 year 2

## 1 GEOMETRICAL CONSTRUCTION:

| 1.1 The Ellipse | Construction of the ellipse. Five methods - Auxiliary <br> circles or Concentric circles, Trammel, Intersecting <br> lines or Rectangle, Intersecting arcs or Foci or Radial <br> interceptors and Compasses or Approximate. <br> Construction of lines and circles tangential to the <br> ellipse. |
| :--- | :--- |
| 1.2 Loci | Loci of simple moving parts/mechanisms. Circular <br> and reciprocating co-planar motion. Glissette, <br> Cranks, Cycloids, Involutes, Archimedean spiral and <br> Helix. |


| 1.3 Helix | To cover simple line helices with one or more |
| :--- | :--- |
|  | revolutions. Its applications such as Springs - |
|  | circular, rectangular or square. Other applications |
|  | (threads not considered). |

1.4 Scales

### 1.5 Enlargement

### 1.6 Areas

Simple or plain scale. Its application.

Linear enlargement and reduction of figures having straight and curved lines. Different methods to be used: radial, pole, proportional, etc.

Conversion of areas. Polygon to quadrilateral, triangle, rectangle, square. Rectangle to rectangle. Rectangle to square etc.

Determination of areas of regular or irregular figures bound by straight and curved lines. Both methods squares and parts of - and mid-ordinate, methods are to be used.

## 2 SOLID GEOMETRY:

### 2.1 Conic sections

2.2 Inclined

The ellipse, the parabola and the hyperbola as conic sections and using radial and sections method. Developments - radial method. Projection of elevations from given developments.

See Form 3 Year 1: 5.5

## 3 ORTHOGRAPHIC PROJECTION:

### 3.1 Assembly

Orthographic projection of assembled components from: in line exploded pictorial projection. From orthographic views and combination of.

### 3.2 Sectioning

Whole, half, part, staggered, removed, revolved.
3.3 Webs / Ribs

Parts and features of parts not normally sectioned. (i.e. longitudinal cutting planes). Webs, ribs, spokes, shafts and similar parts, cut/sectioned along their axis are not to be shown in section.

Parts and features of parts normally sectioned. (i.e. transversal cutting planes). Webs, ribs, spokes, shafts and similar parts sectioned across their axis are to be shown in section.
\(\left.$$
\begin{array}{ll}\text { 3.4 Conventions } & \begin{array}{l}\text { Simple B.S. drawing conventions to represent } \\
\text { components in engineering drawing. Dimensioning }\end{array}
$$ <br>

included. Refer to PP8888.\end{array}\right\}\)| List of commonly used Conventions - annex C. |
| :--- |
| 3.5 Free-hand | | Free-hand sketching of orthographic views with |
| :--- |
| straight and curved lines in good proportion. |

## 4 PICTORIAL PROJECTION:

### 4.1 Planometric

Introduction to planometric projection. Horizontal axis of the object to be $45^{\circ} / 45^{\circ}$ or $60^{\circ} / 30^{\circ}$. In the case of $45^{\circ} / 45^{\circ}$ the height may be reduced, depending on height of object. Including straight and curved lines.
4.2 Perspective

Introduction to perspective projection. Estimated only. Single point and two points perspective. Shading.

### 4.3 Free hand

Free-hand sketching of pictorial views with straight and curved lines in good proportion and either shaded or unshaded.

5 GRAPHICS:

| 5.1 Ideograms | Introduction and examples of. |
| :--- | :--- |
| List of safety signs - annex $E$. |  |

5.2 Logos

### 5.3 Electricity <br> Introduction to electrical circuits and examples of. List of Electrical/Electronic symbols - annex E.

Introduction and examples of.

| 5.4 Graphs | Line, block, pie, pictograms, etc. |
| :--- | :--- |
| 5.5 Flow Charts | Simple Flow Charts of practical nature. Symbols <br> used - terminals, process, input / output, decisions <br> and connectors. |
| 5.6 Computer Graphics | The use of computer as an aid to draughting. To <br> follow a sequence of computer commands for <br> creating graphic images on a pre-printed grid and <br> draw images produced by a given programme. <br> Specimen question/answer-annex F. |
| 5.7 Design | Design in relation to graphical presentation. To find <br> and draw a solution to a given simple problem in <br> design. See specimen paper SEC 2002 -2005 <br> syllabus. |

THE SYLLABUS FOR FORM 5 REMAINS THE SAME.


## Key to British and European Standard Safety Signs



The symbol chosen is to be drawn partially or totally in Black as necessary

The principles of colour and design for the different types of safety sign adopted by BS5378

## PROHIBITION SIGNS

All prohibition sings are red and white. These signs contain a red circle with a diagonal line through it, and the lettering is white upon a red background mounted on white.


## WARNING SIGNS

All warning signs are based upon the colours black and yellow, with the main instruction always being printed in black on a yellow background.


## MANDATORY SINGS

All mandatory signs are based upon a blue background with white instructions.


## SAFE CONDITION SIGNS

All safe condition signs have a green background with the instruction always in white.



The following is a selection of symbols used in electrical / electronic circuit diagrams according to B.S.I. Publication BS 3939 EN 60617.



A computer graphic programme uses the instructions DATA, MOVE \& DRAW to generate an image in the following way

DATA: $\quad A=300: \quad B=400: \quad C=500: \quad D=600: \quad E=700: \quad F=800: \quad G=900:$
ACI 5: MOVE A,D: DRAW D,A: DRAW C,D:
MOVE E,D: DRAW D,A: DRAW G,D: DRAW A,D:
ACI 2: MOVE A,D: DRAW B,E: DRAW C,D: DRAW D,E: DRAW E,D: DRAW F,E: DRAW G,D:

ACl 3: MOVE B,E: DRAW F,E:

The DATA statement specifies the numeric values (in pixels) of given variables.
MOVE positions the cursor at the given location without drawing a line. DRAW draws a line from the current location given by the variable. The instruction ACl (AutoCAD Colour Index Number) will change those images that follow the instruction into a colour that is given by the number.

The computer responds to the following colour commands:

| (ACI) Colour Index Number | Colour |
| :---: | :---: |
| 2 | Yellow |
| 3 | Green |
| 5 | Blue |

The above programme has been written in response to a design brief requiring a trade symbol for a new Jewellery company called Diamonds.
The starter sheet provided shows a pre-printed grid which represents the graphical display ( $1200 \times 1200$ ). Use the grid to draw the image produced by the above programme.



```
Green
Yellow —=- \(=\) - \(=-\) -
Blue
```



