

GRAPHICAL COMMUNICATION

The subject aims at equipping candidates with a wide range of graphical communication methods to communicate effectively with both technical and non-technical personnel. The contents of the syllabus are not limited to technical and engineering elements and a wider context of graphical design elements will be introduced to candidates. The educational experience provided could help to enhance candidates' design and communication skills required in their future living and work.

The subject will be equipped with the necessary drawing facilities available in the drawing rooms. A computer laboratory or an information technology learning centre (ITLC) installed with IT facilities will be erected to support the teaching of the IT contents in the subject.

AIMS

The subject aims at developing in candidates a range of abilities to communicate ideas using graphical means with both technical and non-technical personnel. Candidates should be able to use appropriate visual representation methods including technical graphics, design graphics and computer-aided graphics techniques and other presentation methods to interpret and present technical information, design concepts and different forms of information.

OBJECTIVES

Candidates should be able to demonstrate:

1. the ability to visualise and understand spatial relationships;
2. the ability to understand the presentation methods, principles and conventions for representing technical information or design concepts;
3. the ability to select and use appropriate graphical methods to communicate information and ideas;
4. the ability to use the drawing instruments and supporting facilities to present the information and ideas;
5. the ability to appreciate the styles, methods and accuracy in visual representation;
6. the ability to think analytically, reason progressively and produce creative ideas;
7. aesthetic attributes and strengthen their verbal communication skills through the educational experience.

THE EXAMINATION

The examination will consist of two papers.

Paper 1 Graphical Communication (2½ hours) (70%)

This paper will examine candidates' abilities to solve problems set in the following areas:

1. Design Graphics
2. Spatial Relationships of Objects
3. Technical Graphics
4. Presentation Graphics

The paper will contain 7 questions. Candidates will be required to attempt 5 questions.

Paper 2 Project Work (30%)

This paper will examine the candidates' abilities to use various graphic means to design/communicate ideas or to solve problems.

A list of themes for the project work will be set and sent to schools 10 months before the examination.

Candidates will be required to submit a portfolio which should contain graphical solution(s)/presentation of the problem(s) derived from the selected theme in the following areas:

- (a) Computer-aided graphics (2D and 3D)
- (b) Freehand graphic presentations
- (c) Coloured drawings (excluding Computer-aided graphics)
- (d) Applied graphics (e.g. charts, diagrams and images)

THE SYLLABUS

<i>Topics</i>	<i>Contents</i>
1. Design Graphics	
1.1 Sketching	Draw freehand sketch and illustration of design ideas and artefacts in the form of : <ul style="list-style-type: none">– Isometric, planometric, oblique, perspective, exploded and sectional views;– General arrangement and notation of parts in pictorial and orthographic forms; Use magnified details and partial views to illustrate details of parts. Select the suitable views and illustration methods.
1.2 Graphic Presentation	Understand and apply an understanding of the techniques in graphical presentation using : <ul style="list-style-type: none">– Shading, illumination, texturing, colouring and rendering techniques. Apply technical and artistic lettering to communicate the design ideas. Select suitable layout to achieve visual impact of

Topics

Contents

the graphics.

2. Spatial Relationships of Objects

2.1 Plane geometry

Understand and apply in situational conditions the spatial relationships of objects in geometrical plane involving :

- Lines
Division of straight lines into equal and proportional parts;
- Shapes
Construction of triangles, quadrilaterals, pentagons, hexagons, octagons and ellipses;
Reduction and enlargement of polygons to similar figures with sides or areas in given ratios.
Equivalent areas of plane figures;
Shapes formed from a combination of circles, tangents and tangential arcs;
- Illustration of movement
Construction of the loci of reciprocating and rotating link mechanisms up to a maximum of four elements.

2.2 Solid Geometry

Understand and apply in situational conditions the spatial relationships of objects in geometrical solids involving :

- Sectioning
Sectioning of right geometrical solids limited to spheres, circular cylinders and cones, regular prisms and pyramids by vertical, horizontal or inclined cutting planes which are designated by their traces (excluding oblique planes);
True shape of sections;
- Surface development
Surface development of geometrical solids and their applications in right cones, cylinders, prisms and pyramids;
- Simple interpenetration

<i>Topics</i>	<i>Contents</i>
	Orthogonal views of the interpenetration of right cylinders, prisms, pyramids, cones and spheres in combinations of not more than two solids.
2.3 Projection Methods	Apply the suitable projection methods for presenting objects using : <ul style="list-style-type: none"> – Orthographic projection Orthographic representation, by both first-angle and third-angle methods, of solids in various positions relative to the principal planes; – Isometric projection Isometric views of solids, circles, arcs and other curves. (isometric scale will not be required)
3. Technical Graphics	
3.1 Engineering Drawing	Produce formal drawings (assembly and working) and design graphics involving : <p>Knowledge of orthographic projection by first-angle and third-angle methods, and isometric projection;</p> <p>Hidden details;</p> <p>Drawing to scale and proper spacing of views;</p> <p>Understand the use of standard practice, conventions, abbreviations and machine symbol as used in PD7308 and PD 7307;</p> <p>Dimensioning of pictorial views in accordance with PD 7308;</p> <p>Use of whole, part/local, revolved, removed and staggered sections to show machine details.</p> <p>Apply engineering knowledge involving :</p>

<i>Topics</i>	<i>Contents</i>
	<ul style="list-style-type: none"> – Component parts such as taps, valve bodies, bearings, pulleys, couplings, seals and springs; – Common fixtures and locking devices such as screw threads and fastenings; <p>Assembling of component parts in assembly drawings and detailed drawings in orthographic or pictorial forms.</p>
3.2 Electrical Drawing	<p>Produce formal drawings and design graphics involving :</p> <ul style="list-style-type: none"> – Drawing of elementary electrical and electronic circuits; – Understand and use the standard practice, conventions, abbreviations and electronic symbols as used in PD 7303 / BS 3939.
3.3 Architectural Drawing	<p>Produce formal drawing and design graphics involving :</p> <ul style="list-style-type: none"> – Simple interior design drawings, building drawings and site plans; – Understand the use of the standard practice, conventions, abbreviations and building symbols as used in PD 7301 / BS 1192; – Interpretation of conventional symbols used in building plans to represent outside walls, inside walls, doors, windows, sinks, bath tubs, wash basins, water closets, lighting units and furniture.
4. Computer Graphics	
4.1 Computer Graphics Techniques	<p>Use computer software to design and produce graphics and artistic printouts such as posters or invitation cards.</p>
4.2 2D Computer-aided Design (CAD)	<p>Apply 2D Computer-aided Design (CAD) techniques to design and produce simple electrical, architectural and engineering drawings.</p>

<i>Topics</i>	<i>Contents</i>
4.3 3D Modelling	Apply elementary 3D CAD techniques to design and produce simple isometric, orthogonal and assembly drawings for separated or assembled components of engineering drawing.
4.4 Introduction to Computer Animation	Introduce the use of computer animation software to demonstrate the movement of objects and produce visual images on the display.
4.5 Introduction to Computer Imaging	Introduce the use of computer imaging software to digitize photographs or pictures and to process digital images.
5. Presentation of Design Graphics	
5.1 Presentation Techniques	Design and apply signs, symbols or diagrams to represent ideas. Design and apply statistical graphs, charts and pictograms to represent data. Design and apply flowcharts, progress diagrams or pictorial sequential diagrams to represent activities. Design and apply photographs, cutaway drawings, photo-drawing montage and animated graphics to illustrate component parts or artefacts. Design and apply maps or site plans to represent locations.
5.2 Computer Presentation Techniques	Apply computer presentation techniques to produce texts, charts, diagrams, graphic images for demonstration and presentation purposes.
5.3 Desktop Publishing	Design and produce printouts with the combination of texts, charts and graphic images.
6. Design and Application	
6.1 Design and Communication	Exercise design skills from recognition of design needs , drawing up the design criteria, develop and propose solutions to

Topics

Contents

evaluation of solutions.

Communicate and present design ideas by applying various aspects of the graphical design and communication skills learnt.

6.2 Design and Application Design and produce design drawings, folios and advertising posters for solving design problems identified in the home, school, business, industrial or community context.

Make window display, 3D prototype or mock-up models for visualising design suggestions and solutions.

Note : Candidates are expected to have basic design and drafting skills gained in Technical Drawing/Graphical Communication or related subjects at the junior forms.

Standard Drawing Practice and Conventions

PD 7308 : Engineering Drawing Practice for Schools and Colleges

PD 7307 : Graphical Symbols for Use in Schools and Colleges

PD 7303 : Electrical and Electronic Graphical Symbols for Use in Schools and Colleges

PD 7301: Building Drawing Practice for Schools and Colleges

BS 308 part 1 : Engineering Drawing Practice – General Principles

BS 308 part 2 : Engineering Drawing Practice – Dimensioning and Tolerancing of Size

BS 3939 : Graphical Symbols for Electrical Power, Telecommunications and Electronics Diagrams

BS 1192 : Building Drawing Practice

BS 4058 : Data Processing Flow Chart Symbols, Rules and Conventions