TECHNICAL DRAWING (67)

(Candidates offering Technical Drawing Applications are not eligible to offer Technical Drawing.)

Aims:

1. To develop competence among the students to pursue technical courses like engineering, architecture, draftsmanship, surveying and other professional courses where mechanical and geometrical drawings are involved.
2. To acquire basic knowledge and understanding of mechanical drawing.
3. To acquire skills of making and understanding technical drawing which enables translation of ideas of a designer on paper into physical product and appliances.

CLASS IX

*There will be one written paper of **three** hours duration carrying 80 marks and Internal Assessment of 20 marks.*

*The paper will be divided into **two** sections, A and B.*

***Section A** will consist of a number of questions covering the entire syllabus. The candidates are to attempt three questions.*

***Section B** will consist of questions which will require detailed answers. There will be a choice and candidates will be required to answer **two** questions from this section.*

1. Lettering and Numbering

(i) Freehand of a single stroke, vertical slant.

2. Orthographic Projection

(i) First or third angle drawing.

(ii) Draw the orthographic projection of an object given in 3-dimension form.

(iii) Draw the third orthographic view from the given two views.

(The exercises should be of objects whose outlines are parallel to the axis and non-isometric.)

3. Sketching

Sketching involving common tools and processes along with common simple mechanical devices met within everyday life. e.g.:

(a) Woodwork tools such as wheelbarrow, wheels and axle, turnbuckle, tool rest for wood in the wooden jack plane, two irons of a jack plane, saw, etc.

(b) Metalwork tools such as engineer's bench vice, files of various types and shapes, hammers, chisels, drills, hacksaw, etc.

(c) Items of everyday use such as fountain pen, ball pen, geometrical instruments, pencils, rulers, shoe brush, nut crackers, pincers, pliers, etc.

(d) Common visible items such as cold water tap, bicycle, scooter, street lamp, table and chair, radio, two-in-one tape recorder, sound systems, television, teacher's desk and chair, electric fans of various types, black board, etc.

INTERNAL ASSESSMENT

A minimum of three assignments are to be done during the year, as assigned by the teacher.

CLASS X

*There will be one written paper of **three** hours duration carrying 80 marks and Internal Assessment of 20 marks.*

*The paper will be divided into **two** sections, A and B.*

***Section A** will consist of a number of questions covering the entire syllabus. The candidates are to attempt three questions.*

***Section B** will consist of questions which will require detailed answers. There will be a choice and candidates will be required to answer **two** questions in all from this section.*

1. Geometrical Drawing

(i) Plane Geometry

TANGENCY: simple problems relating to tangency.

- circle and circle.
- straight line and straight line; parallel or at right angle to each other.
- tangency passing through a point or at 2 points.
- or tangency involving any of the above mentioned elements.

SCALES: diagonal and isometric scales, plane scale, division of lines into equal or proportional divisions, use of scale to draw views of polygons. Construction of polygons up to 6 sides. Areas of polygons. Change of the area of the figure constructed into a triangle having the same area.

(ii) Solid Geometry

- Auxiliary elevation and auxiliary plan
- True shape
- True length
- Orthographic projection of prisms which are placed at an incline to the horizontal plane or incline to vertical plane.
- Solid with surface or axes inclined to the H.P., use of auxiliary plane. Projection of the end elevation on solids. Solids with the surface or axes inclined to the V.P. prisms with the surfaces inclined to the H.P. and the axis inclined to the V.P. but parallel to the H.P. Determination of the true length of a line when inclined to both planes of H.P. References, e.g., the slant edges of a pyramid.
- Sectioning of prisms, pyramid.
- Development of the surface of a common solid. Section planes representation of the V.T. and H.T. sections in solids in simple positions, e.g., the cube prism and true shape of sections. The section planes are to be parallel or inclined to one plane or reference only. Development of the surface of the cut solids.

2. Isometric and Oblique Drawing

(i) Conversion of isometric or oblique drawings into sectional orthographic views.

(ii) Conversion of orthographic view into isometric drawings.

(iii) Converting the given orthographic views into sectional views and adding the missing views.

(iv) Woodwork joints - mortice and tenon and dovetail. Representation of cylinders single or in combination and modification of cylinders, e.g., pipe with flange, cams, figures made up of prisms, pyramids and round surfaces.

INTERNAL ASSESSMENT

(A) Course Work

(1) Candidates will be required to do workshop practice in woodwork or metalwork. They may also undertake practical work on any of the topics suggested below.

The practical work of the candidates will be assessed by the teacher as course work. The teacher is free to assess the course work either on the basis of continuous assessment or on the basis of periodical tests.

(2) Suggested topics for practical work:

(i) **Woodwork**: house joint, dovetail joint, mortice and tenon joint, dovetail and teehalving joint, bridle joint and their use in the construction of specified models. The proper use of nails, screws or glue in assembling a model.

(ii) **Metalwork**: Operations such as wire bending, sheet work, filing, drilling, punching, chipping, sawing, riveting, soldering and forging.

(B) Finished Work

In addition to the course work the candidates will have to produce four pieces of finished woodwork or metalwork for the assessment by the Visiting Examiner. These pieces of woodwork or metalwork may be based on the topics listed in (A) (2) above or taken from any other aspect of woodwork or metalwork.

(C) Assessment

(i) The teacher and the visiting examiner will assess the practical work of the candidates.

(ii) While assessing the candidates the following aspects of practical work should be taken into consideration:

- Correct use of material and its preparation.
- Marking-out procedure and check on definite sizes.
- Details of construction, joints, etc.
- Skill in the use of tools and materials.
- Surface finished and application of finishes, polish, etc.

Other aspects may be considered depending on the nature of the practical work.

EVALUATION

The assignments/project work are to be evaluated by the subject teacher and by an External Examiner. (The External Examiner may be a teacher nominated by the Principal, who could be from the faculty, **but not teaching the subject in the section/class**. For example, a teacher of Geometrical and Mechanical Drawing of Class XI may be deputed to be an External Examiner for Class X Technical Drawing Projects.) The Internal Examiner and the External Examiner will assess the assignments independently.

Award of marks (20 Marks)

Subject Teacher (Internal Examiner)	10 marks
External Examiner	10 marks

The total marks obtained out of 20 are to be sent to the Council by the Principal of the school.

The Head of the school will be responsible for the entry of marks on the mark sheets provided by the Council.

INTERNAL ASSESSMENT IN TECHNICAL DRAWING - GUIDELINES FOR MARKING WITH GRADES

Criteria	Preparation	Analysis	Process	Results	Presentation
Grade I (4 marks)	Follows instructions (written, oral, diagrammatic) with understanding; modifies if needed. Familiarity with and safe use of apparatus, materials, techniques.	Analyses problem systematically. Recognises a number of variables and attempts to control them to build a logical plan of construction.	Comments upon, recognises use of instruments, degree of accuracy. Process is systematic.	Recognises and comments upon sources of error. Can deal with unexpected effects, suggesting modifications.	Presentation is accurate and good. Appropriate techniques are well used.
Grade II (3 marks)	Follows instructions to perform experiment with step-by-step operations. Awareness of safety. Familiarity with apparatus, materials and techniques.	Specifies sequence of operation; gives reasons for any change in procedure.	Makes relevant procedural modification. No assistance is needed for understanding steps of constructions.	Draws qualitative conclusions to proceed with construction.	Presentation is adequate. Appropriate techniques are used.
Grade III (2 marks)	Follows instructions to perform a single operation at a time. Safety awareness. Familiarity with apparatus & materials.	Develops simple development strategy. Trial and error modifications made to proceed with the construction.	Detailed instructions not given.	Draws obvious qualitative conclusions as required in the process.	Presentation is okay, but disorganised in some places. Overwriting; rough work is untidy.
Grade IV (1 mark)	Follows some instructions to perform a single practical operation. Casual about Safety. Manages to use apparatus & materials.	Struggles through the construction. Follows very simple techniques.	Tends to make mistakes in the following procedure.	Even when detailed format is provided, struggles or makes errors while processing the work.	Presentation is poor, disorganised but follows an acceptable sequence. Rough work missing or untidy.
Grade V (0 marks)	Not able to follow instructions or proceed with practical work without full assistance. Unaware of safety.	Cannot proceed with the development without help from time to time.	Even when format is given procedure is not understood.	Cannot process the work even with considerable help.	Presentation unacceptable; disorganised, untidy, poor. Rough work missing.