ICSE

YEAR 2027

INDIAN CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

TECHNICAL DRAWING APPLICATIONS

(65)

February 2025

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Council for the Indian School Certificate Examinations (CISCE)

MISSION STATEMENT

The Council for the Indian School Certificate Examinations is committed to serving the nation's children, through high quality educational endeavours, empowering them to contribute towards a humane, just and pluralistic society, promoting introspective living, by creating exciting learning opportunities, with a commitment to excellence.

ETHOS OF CISCE

- Trust and fair play.
- Minimum monitoring.
- Allowing schools to evolve their own niche.
- Catering to the needs of the children.
- Giving freedom to experiment with new ideas and practices.
- Diversity and plurality - the basic strength for evolution of ideas.
- Schools to motivate pupils towards the cultivation of:
  Excellence - The Indian and Global experience.
  Values - Spiritual and cultural - to be the bedrock of the educational experience.
- Schools to have an 'Indian Ethos', strong roots in the national psyche and be sensitive to national aspirations.

*There will be **one** written paper of **three hours** duration carrying 100 marks and Internal Assessment of 100 marks.*

THEORY – 100 Marks

SECTION A

1. Geometrical Constructions based on Plane Geometry

(i) Division of a line into equal or proportional parts: Construction of a triangle/ quadrilateral when its perimeter and the ratio of the lengths of its sides are given.

(ii) Division of a circle into equal parts (4, 6, 8, 12) using set square or compasses.

(iii) To find the length of an arc/circumference of a circle.

(iv) An angle and a circle touching its sides.

(v) A circle of given radius passing through two given points.

(vi) An arc passing through three non-collinear points.

(vii) A continuous arc passing through not more than 5 non-collinear points.

(viii) A regular polygon (3, 4 5 6 sides) with special methods (side given).

(ix) Construction of a regular octagon in a square (side of the square = distance between parallel sides of a octagon).

(x) More than one polygon (sides 3, 4, 5, 6, 7, 8) on a common base on the same side/opposite sides.

(xi) Inscribing/Circumscribing a circle on a regular polygon (3, 4, 5, 6 sides).

(xii) Inscribe/Circumscribe a circle of given radius by a regular polygon up to six sides.

(xiii) In a regular polygon to draw the same number of equal circles as the sides of the polygon each circle touching one /two sides of the polygon and two of the other circles externally.

(xiv) Outside a regular polygon to draw the same number of equal circles as the sides of the polygon each touching one side of the polygon and two of the other circles externally.

(xv) Regular hexagon and 3 equal circles inside it touching one side/ two sides of the hexagon and the other two circles externally.

(xvi) A circle and (3, 4, 5, 6,) equal circles inside it touching internally and touching each other externally.

(xvii) Tangents to a circle at a point on the circumference.

(xviii) Direct common tangents/Transverse common tangents to two equal/unequal circles. Also, to measure and record their lengths.

(xix) Drawing (not more than three) circles touching each other externally and also touching two converging lines (radius of one of the circles is given).

2. Area constructions

(i) Constructions based on the application of area theorems (area of polygons).

(ii) Converting the given polygon into a triangle having equal/half/double the area of the polygon.

(iii) Changing given triangles (2 or 3) into a single triangle having the area equal to the sum of the areas of the given triangles.

Methods for constructing:

- *a scalene triangle / isosceles triangle /a right angled triangle equal to the area / half the area / twice the area of any given quadrilateral.*
- *a parallelogram equal in area to any given triangle.*
- *a triangle equal in area to the sum of any two / three given triangles.*
- *a triangle equal in area / half the area to any given regular pentagon / hexagon.*

- *a triangle of a given base / altitude, equal in area to another given triangle.*
- *a triangle equal in area to ½ or twice the area of any given triangle.*
- *a square equal in area to any given parallelogram / triangle / rectangle.*
- *a square, equal in area to any given regular pentagon / hexagon.*

3. Templates as an application of geometrical constructions and other constructions such as:

(i) Arc of a given radius touching a given line and passing through a given point.

(ii) Arc of given radius touching two intersecting straight lines.

(iii) Arc of given radius touching a given arc and a straight line.

(iv) Arc of a given radius touching two given arcs (externally/internally).

(To redraw the given figure and insert the dimensions).

*Applying the construction methods, involving circles, tangential, circles / arcs /straight lines and points, for constructing **TEMPLATES** of various shapes.*

4. Scales

(i) To find the R.F. (Representative Fraction) and the scale length from the given data by showing neat working.

(ii) Construction of a plain scale/diagonal scale.

(iii) Use of constructed scale in the preparation of field drawing scale diagram (Enough data to be provided).

Definition of R.F. formula. Finding the Representative Fraction (R.F.) and the Scale length by the given data by showing neat working/lettering. Construction of Plain and Diagonal Scales in different units of linear measurements, and marked and numbered accordingly. Transferring the required measurements, from the constructed scale, to create finished Scaled drawings, of: field drawings / templates / Orthographic projections / plane geometrical constructions.

5. Engineering Curves

An ellipse, a parabola

Engineering Curves (construction only) as used in manhole covers, arches, dams, monuments etc.

(i) Ellipse: (major and minor axes given)

(a) by arcs of circles method.

(b) by the concentric circles method.

(c) by oblong method.

(ii) Parabola (base and axis given)

(a) *by rectangle method.*

(b) by tangent method

6. Solids

(i) Orthographic projections of right solids such as regular prisms and pyramids with bases as regular polygons up to six sides, cylinder and cone.

(a) Axis perpendicular to one of the reference planes and parallel to the other.

(b) Axis parallel to both the reference planes (prism/cylinder only).

(c) Axis inclined to one of the reference planes and parallel to the other. Use of auxiliary plane may be included (Auxiliary elevation and auxiliary plan).

(ii) Development of surfaces of the right solids (Parallel and Radial).

(iii) Determination of true length of line when inclined to both the reference planes e.g. slant edge of a pyramid.

***Right Solids**, such as, **Prisms** (triangular, square, pentagonal and hexagonal)*

Pyramids (triangular, square, pentagonal and hexagonal bases.), Cylinders and Cones

Simple word problems on:

(i) Orthographic projections of right solids.

- *with its axis, perpendicular to one plane, and, parallel to the other plane.*
- *with its axis, parallel to both planes.*
- *with its axis, parallel to one plane, and, inclined to the other plane.*

(ii) Parallel and Radial Development of lateral surfaces of right solids with axis perpendicular to H.P. and parallel to V.P.

(iii) Determination of true length of the slant edge of a pyramid when the slant edge is inclined to both H.P. and V.P.

(iv) Auxiliary views:

Figure showing auxiliary inclined plane should be given with the word problem.

— *Auxiliary elevation of right solid with axis parallel to H.P. and inclined to V.P.*

— *Auxiliary plan of a right solid with axis inclined to H.P. and parallel to V.P.*

7. Oblique drawing

Conversion of given orthographic views to oblique view (circular parts in top view to be excluded). Circular parts only in one view either in front view or in the side view. The angle of inclination with the receding axis to be given

SECTION B

8. Sections of right solids (prism, pyramid, cylinder and cone)

(i) Sectional views of cut solids with axis perpendicular to H.P. and parallel to V.P.

(a) V.T. (Vertical Trace) parallel to or inclined to H.P.

(b) H.T. (Horizontal Trace) parallel/inclined to V.P. (Figure showing V.T and H.T should be given) Questions based on word problems should be excluded.

(ii) Axis parallel to both the reference planes (prism and cylinder only) with H. T. or V.T. of cutting plane shown in the figure.

(iii) Development of lateral surfaces of cut solids (parallel, radial): Prism, Pyramid, cylinder, cone.

(iv) Development of pipe joints as elbow joints, exhaust pipes etc. and the objects made of sheet metals in the shape of cylinders.

(v) True shape of a section.

(vi) Auxiliary views (A.F.V. /A.T.V.) of cut solids with axis perpendicular to H.P and parallel to V.P with

(a) Auxiliary plane parallel to the cutting plane.

(b) Auxiliary plane inclined to H.P at a given angle θ.

Sections of Right Solids, *such as,* ***Prisms, Cylinders, Pyramids*** *and* ***Cones.***

Sectional views, of cut / truncated solids,

- *with its axis, perpendicular to the H.P. and parallel to the V.P., when the cutting plane is parallel / inclined to H.P. or, to the V.P. (only one cutting plane to be expressed in the figure)*
- *with its axis, parallel to both planes (prisms and cylinders only), with not more than one cutting plane shown in the figure.*

Developments *of the lateral surfaces of:*

- *Cut Solids / Truncated Solids (parallel and radial), such as, Prisms, Cylinders, Pyramids and Cones with one cutting plane shown in the figure.*
- *Cylindrical pipe joints, as used for constructing, Chimneys, Ventilators, exhaust pipes, etc., as application of development of lateral surfaces of cut/truncated cylinders with one/more than one cutting plane shown in the figure.*

Auxiliary view, *of cut / truncated solids such as prism / pyramids / cylinder / cone, when the axis is perpendicular to the H.P. and parallel to the V.P. with the Auxiliary plane;*

- *parallel to the cutting plane.*
- *at an inclination to the H.P*

Auxiliary plane should be shown in the figure and the ***True Shape*** *of the, cut / truncated, surface of right solids such as prism / pyramid / cylinder / cone when axis is perpendicular to H.P. and parallel to V.P.*

9. Isometric Drawing (Use of scale to draw isometric drawing may be included. e.g. 2:1 or 1:2 only).

(a) Copy the given isometric figure.

(b) Conversion of the given orthographic view into isometric drawing.

(c) Isometric projection by constructing and making use of an isometric scale.

***Isometric Drawing**: In full scale and maybe in the scale of 2:1 or 1:2.*

- *Drawing the Isometric view, from a given, Isometric view.*
- *Drawing the Isometric view, by reading and visualizing the same, from the given Orthographic views.*
- *Drawing the Isometric projection from either a given pictorial view or the Orthographic views, by constructing and using the **Isometric Scale.***

10. Sectional Orthographic views (1st and 3rd angle methods)

(a) Conversion of given pictorial view (Isometric/oblique into sectional/half sectional orthographic views).

(b) Conversion of a given orthographic view into sectional/half sectional views and adding the missing view.

***The Orthographic Projection,** First and third, angle methods: (at least one of the views as sectional view).*

- *Drawing the Orthographic views / full sectional views / half-sectional views of an object shown in a given pictorial view: Isometric / Oblique with cutting plane / planes shown.*
- *Converting the given Orthographic view / views into Sectional views, full / half according to the Cutting plane line / lines marked in a given view / views.*
- *Dimensioning the Orthographic views showing the cutting plane, naming the views.*

PART II- INTERNAL ASSESSMENT - 100 MARKS

1. To prepare a file containing minimum 15 drawing assignments. The drawing assignments should cover entire syllabus of class X. One / two assignments on each units of syllabus should be prepared on half imperial size drawing paper.
2. To make a three-dimensional model with stiff cartridge paper / chart paper involving the application of the development of solids such as a prism / pyramid.
3. To make a model with thermocol involving the application of the true shape of the section of truncated solids such as a prism / pyramid / cylinder / cone.

EVALUATION

The assignments/project work is to be evaluated by the subject teacher and by an External Examiner. The External Examiner may be a teacher nominated by the Head of the school, who could be from the faculty, **but not teaching the subject in the section/class.**

The Internal Examiner and the External Examiner will assess the assignments independently.

Award of Marks	**(100 Marks)**
Subject Teacher (Internal Examiner)	50 marks
External Examiner	50 marks

The total marks obtained out of 100 are to be sent to CISCE Council by the Head of the school.

The Head of the school will be responsible for the online entry of marks on CISCE's CAREERS portal by the due date.

INTERNAL ASSESSMENT IN TECHNICAL DRAWING APPLICATIONS - GUIDELINES FOR MARKING WITH GRADES

Criteria	Preparation	Analysis	Process	Results	Presentation
Grade I (4 marks)	Follows instructions (written, oral, and 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.