## ENGINEERING DRAWING

### CLASS-XI

#### THEORY

<table>
<thead>
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<th>Unit</th>
<th>Marks</th>
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<tr>
<td><strong>One Paper</strong></td>
<td>3 Hours</td>
</tr>
<tr>
<td><strong>PLANE GEOMETRY</strong></td>
<td></td>
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<tr>
<td>1. Construction of lines, angles and rectilinear figures</td>
<td>4</td>
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<td>2. Construction of circles, semi-circles and tangents</td>
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<td>3. Construction of ellipse, parabola, involute, cycloid, helix and sine-curve</td>
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<td>5. Section of solid-figures</td>
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<td>8. Development of surfaces</td>
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<td><strong>Total Marks</strong></td>
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### PLANE GEOMETRY

- **Unit 1**: Construction of lines, angles and their divisions. Simple questions based on triangles, squares, rhombuses, trapeziums, regular polygons-pentagon, hexagon and octagon. 08 Pds.

- **Unit 2**: Construction of circles, external and internal tangents of circles, inscribing of circles in equilateral triangle, square, rhombus, regular polygons-pentagon, hexagon and octagon. 10 Pds.

- **Unit 3**: (a) Construction of ellipses by the following methods:
  - (i) Concentric circles
  - (ii) Intersecting arcs
  - (iii) Intersecting lines

  (b) Construction of Parabola by the following methods:
  - (i) Intersecting lines
  - (ii) Intersecting arcs

  (c) Construction of involute of a circle,

  (d) Construction of cycloid, helix and sine curve 20 Pds.
SOLID GEOMETRY

Unit 4 : Methods of orthographic projections and dimensioning strictly as per SP: 46-1988 revised conventions. Projection of points, lines, regular plane figure and right regular solids such as cubes, prisms and pyramids (square, triangular, pentagonal and hexagonal), tetrahedrons, cones, cylinders, spheres, hemi-spheres and frustum of solids when they are kept with their axis perpendicular, to HP/VP or parallel to one plane and inclined to the other or parallel to HP and VP both.

Unit 5 : Section of solids under the same conditions mentioned above made by the horizontal, vertical and inclined planes, also showing true-shape of section

MACHINE DRAWING

Unit 6 : Orthographic projections of machine blocks.

Unit 7 : Construction of Isometric scale showing main devisions of 10 mm and smaller divisions of 1 mm each. Isometric projection (drawn to isometric scale) of figures such as triangles, squares, pentagons, hexagons, circles and semi-circles with their surface parallel to HP or VP and its one side or diagonal or diameter should be either parallel or perpendicular to HP/VP.

Unit 8 : Development of the surfaces of following solids :
1. Cube, cuboid, prisms-triangular, square, pentagonal and hexagonal.
2. Pyramids (triangular, square, pentagonal and hexagonal).
3. Right-circular-cylinder and cone

ENGINEERING DRAWING

CLASS-XI

PRACTICAL

One Paper (Practical) 3 Hours 30 Marks

1. Developing “Prisms” & “Pyramids” with the help of card baord (thick paper).
2. Developing different types of packing boxes (cartons).
3. Making different types of graphics designs/murals for interior/exterior decorations using coloured laminae using the knowledge of circumscribing, inscribing and describing of plane geometrical figures.
4. Drawing ellipse by
   (a) Trammel method
   (b) Thread method
   On ground or drawing-sheets/ply-wood.

5. Preparing top-view (plan) of a
   (a) Class-room
   (b) Drawing-room
   (c) Home
   Showing different objects in it.

6. Drawing through activities :
   (a) Involute
   (b) Cycloid
   (c) Helix
   (d) Sine-curves and listing their uses in daily life.

7. Preparing the following sections of solids (prisms, pyramids, sphere etc.) with clay, soap, thermoel, plasticine, wax or any other material easily and economically available.
   When the cutting plane is :
   (i) Parallel to the base
   (ii) perpendicular to the base
   (iii) inclined to the base
   (iv) cutting at a given height at a given angle above the base.
   Also making different objects with combination of above solids and their section models.

Note :
I. In all the practicals drawing/sketching of the views should be incorporated and evaluated accordingly

II. The scheme of evaluation is as follows :
   (a) Practicals (2) 15 Marks
   (b) Drawing/Sketch 05 Marks
   (c) Viva-voce 05 Marks
   (d) Sessional Work 05 Marks

Total 30 Marks

PRESCRIBED TEXTBOOK :

1. Basic Engineering Drawing Part I
   By : V.P. Kumar
   Published by : Kumaron Publishers, New Delhi.

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ENGINEERING DRAWING
CLASS - XI
THEORY

DESIGN OF THE QUESTION PAPER

The weightage of the distribution of marks over different contents of the question paper shall be
as follows :-

One Paper 3 Hours 70 Marks

A. Weightage to Contents/Subject Units

UNIT-1 PLANE GEOMETRY

<table>
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UNIT-2 SOLID-GEOMETRY

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<td>i.</td>
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<td>12</td>
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<td>ii.</td>
<td>Section of solid figure.</td>
<td>15</td>
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UNIT-3 MACHINE DRAWING

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<td>i.</td>
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<td>ii.</td>
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<td>iii.</td>
<td>Development of surfaces.</td>
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Total Marks 70

B. SCHEME OF OPTION

(I) There will be no overall options.

(II) Internal choice has been given in question of Machine Drawing.

C. WEIGHTAGE TO DIFFERENT LEVELS OF QUESTIONS

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<th>Sl. No.</th>
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Full Marks : 70
ENGINEERING DRAWING
(PRACTICAL INSTRUCTION)
CLASS - XI

One Paper 3 Hours Full Marks : 30
Pass Marks : 12

INSTRUCTION TO EXAMINERS
Collect Record book/Drawing sheets from the students before they start practical work.
Only Drawing Instruments are allowed in the practical hall:

DISTRIBUTION OF MARKS/VALUE POINTS MAY BE AS FOLLOWS :

1. (i) Drawing 4
   (ii) Folding of edges 2
   (iii) Finishing of objects 1

2. (i) Preparing to the scale 5
   (ii) Cutting accurately to the given measurement 5
   OR
   (i) Number of geometrical shape used 2
   (ii) Correct used of shape 3
   (iii) Proper Assembling to get desired design 3

3. A. (i) Proper labeling 1
   (ii) Drawing 4
   Or
   B. (i) Accurate Measurement 1
   (ii) Correct procedure 2
   (iii) Proper shape 2

4. * Viva Voce — (at least 5 questions relating to the practical activities mentioned above are to be asked.) 5

5. * Sessional work [Regularity, neatness and no. of records/sessional work are to be observed] 5

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ENGINEERING DRAWING
CLASS-XII
THEORY

One Paper 3 Hours 70 Marks

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<td>I. Isometric projections of solids</td>
<td>25</td>
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<td>II. Machine Drawing</td>
<td></td>
</tr>
<tr>
<td>A. Drawing of Machine parts</td>
<td>15</td>
</tr>
<tr>
<td>B. Sectional view of assembly of machine parts :</td>
<td>30</td>
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Unit I : Isometric projection of solids
50 Pds.

Construction of isometric scale showing main divisions of 10mm and smaller divisions of 1mm, also showing the leading angles. Helping view/s such as triangles, pentagon, hexagon etc. can be drawn using scale 1:1 or isometric scale. Hidden lines are not required in isometric projection.

Isometric projections (drawn to isometric scale) of solids, such as cube, regular prism and pyramids (triangular, square, pentagonal and hexagonal), cone, cylinder, sphere, hemisphere, frustum of right regular pyramids (triangular, square, pentagonal, hexagonal) and cone, when they are cut by a plane parallel to the base. The axis of the solid should be either perpendicular to H.P. or perpendicular to the VP or parallel to HP and VP both. (Indicate the direction of viewing)

Combination of two solids (except “frustum” of Pyramids and Cone) Keeping the base side parallel or perpendicular to H.P./V.P. and placed centrally together, but in no case the common axis of both the solids should be given parallel to H.P.

Note : Question on single solid will be asked in vertical position only.

Unit II : Machine Drawing
36 Pds.

A. Drawing of machine parts
(i) Drawing to full size scale with instruments. 9 marks

(Internal choice will be given between any two of the following).
Standard profiles of screw threads (square, knuckle, B.S.W. Metric (external and internal) and nomenclature of threads: Bolts (square, Hexagonal, Tee and Hook); Nuts: (square and hexagonal), Plain washer, combination of nut and bolt with or without washer for assembling two parts together, single riveted lap joint with standard dimensions.

(ii) Free-hand sketches  
(Internal choice will be given between any two of the following) conventional representation of external and internal threads; studs (plain, plain with square-neck and collar); screws (round-head, cheese-head, 90 flats countersunk-head, hexagonal socket-head and grub-screw; Types of rivets: -- snap head, pan head--without tapered neck, flat head and 60 countersunk flat head; Types of sunk-keys (rectangular taper, woodruff and double-head feather key with gib head on both ends).

6 marks

B. Assembled views of the following Machine parts:  
(Internal choice will be given in the examination between any two of the following assembly drawings, given in the “orthographic views” of the components drawn separately).

Note: 
1. In all the following assembly drawings only half sectional front view will be asked and the other half without section.
2. Side/End view or Top View/Plan will be drawn without section, wherever applicable.
3. In no view hidden edges/lines are required.

1. Bearings
   (i) Open-Bearing
   (ii) Bushed-bearing
   (iii) Footstep-Bearing (only sectional front-view will be asked)
   (iv) Simple Plummer-Block (only sectional front view will be asked with only round brases).

2. Rod-Joints
   (i) Cotter-joints for circular-rods (socket and spigot joint)
   (ii) Cotter-joints for round-rods (sleeve and cotter joint)
   (iii) Cotter-joints for square rods (Gib and cotter-joint)
   (iv) Knuckle-joints (only sectional front view will be asked)

3. Tie-rod and Pipe-joint
   (i) Tumbuckle
   (ii) Flange pipe joint

4. Couplings
   (i) Unprotected Flange Coupling (having socket and spigot arrangement)
   (ii) Protected Flange Coupling

5. Pulleys
   (i) Solid cast Iron Pulley (upto 200mm diameter) having solid web
   (ii) Single groove V-ball pulley (upto 200 mm diameter)

ENGINEERING DRAWING  
CLASS-XII  
PRACTICAL  

One Paper (Practical)  
3 Hours  
30 Marks, 72 Pds.

To perform the following jobs from the given views of the prescribed Machine Block (two).

1. Block-one, by the external examiner.
2. Block-two, by the internal examiner.

Value-Points

Part ‘A’
1. Copy the given views  
   1x2=2
2. Drawing the missing view with hidden line  
   1/3x2=3
3. Sketching the Isometric view without hidden edges  
   2/3x2=5
4. To make the machine block of te above in three dimensions. (not to scale but approximately proportionately) drawn with any medium i.e. thermocol, soap-cake, plasticine, clay, wax etc.  
   5x2=10

Part ‘B’
   Viva-voce-questions based on the practicals  
   Performed in Part ‘A’  
   5

Sessional Work:
   Solution of the fifteen Prescribed Machine Blocks.  
   5

TOTAL  
30 Marks

Prescribed Textbook:
1. Basic Engineering Drawing Part II  
   By : V.P. Kumar and Jasbir Singh  
   Published by : Kumarsons Publishers, New Delhi.
Important:
(i) All dimensions are in mm.
(ii) The above diagrams are not to scale.
(iii) Assume suitably, missing or mismatching dimensions, if any.
(iv) Follow I angle method of projection only in all drawing or sketches.
ENGINEERING DRAWING
CLASS - XII
THEORY
DESIGN OF THE QUESTION PAPER

The weightage of the distribution of marks over different contents of the question paper shall be as follows:

One Paper

3 Hours

70 Marks

A. WEIGHTAGE TO CONTENTS/SUBJECT UNITS

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ENGINEERING DRAWING  
(PRACTICAL INSTRUCTION) 
CLASS - XII

One Paper  
3 Hours  
Full Marks : 30 
Pass Marks : 12

INSTRUCTION TO EXAMINERS

Collect the drawing sheets/models/sessional activities from the students before starting practical works for assessment.

DISTRIBUTION OF MARKS FOR EACH OF THE VIEWS MAY BE AS FOLLOWS:

1. (i) Copy the given views  
   2x2 = 4

   (ii) Drawing the missing view with hidden line  
        1½x2 = 3

   (iii) Sketch the isometric view without hidden edge.  
        (a) Isometric sketch  
             2x2 = 4
        (b) Dimension  
             ½x2 = 1

   (iv) Make the machine block of the above in 3 dimension  
        (not to scale but approximately proportionally drawn  
        with any medium i.e. thermocal, socket, plasticine, clay,  
        waxes etc.)  
        (a) Model  
             4x2 = 8
        (b) Neat & Tidy  
             1x2 = 2

2. * Viva Voce –  (at least 5 questions based on the above  
   activities.  
   5

3. * Sessional work  
   5

* * * * * * *