

COMPUTER AIDED ENGINEERING DRAWING

LAB MANUAL

Year : 2016 - 2017
Subject Code : AME102
Regulations : R16
Class : I B.Tech II Semester
Branch : AE / ME / CE

Prepared By

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Assistant Professor



MECHANICAL ENGINEERING
INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

PROGRAM OUTCOMES

Program outcomes		Level	Proficiency assessed by
PO1	Ability to apply acquired knowledge of science and engineering fundamentals in problem solving.	H	Assignments and Tutorials
PO2	Ability to undertake problem identification and interpretation.	S	Tutorials
PO3	Ability to utilize Auto CAD approach in drawing.	S	Exams
PO4	Graduates will demonstrate an ability to identify and solve complex problems.	S	Mini Projects
PO5	Graduate will be capable to use modern tools and packages available for their professional arena.	H	Assignments, Exams
PO6	Understanding of the social, cultural responsibilities as a professional engineer in a global context.	H	Assigning Mini Projects
PO7	Understanding the impact of environment on engineering designs based on the principles of inter-disciplinary domains for sustainable development.	H	Assignments
PO8	Ability to understand the role of ethics in professional environment and implementing them.	N	-----
PO9	Competency in software development to function as an individual and in a team of multidisciplinary groups.	H	Assignments, Tutorials and Exams
PO10	Ability to have verbal and drawing skills to use effectively not only with engineers but also with community at large.	N	-----
PO11	Ought to have strong fundamentals in Mechanical Engineering and be able to have lifelong learning required for professional and individual developments.	H	Mini Projects
PO12	Be able to design, implement and manage projects in Mechanical Engineering with optimum financial resources, environmental awareness and safety aspects.	N	-----

PROGRAM SPECIFIC OUTCOMES

Program Specific Outcomes		Level	Proficiency Assessed by
PSO 1	Professional Skills: The ability to research, understand and implement computer programs in the areas related to system software for efficient analysis and design of computer-based solution.	H	Lectures, Assignments
PSO 2	Software Engineering practices: The ability to apply standard practices and strategies in Auto CAD software with ability to deliver a quality service.	S	Projects
PSO 3	Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths, to be an entrepreneur, and a zest for higher studies.	H	Guest Lectures

Institute of Aeronautical Engineering, Dundigal

Department: Mechanical Engineering

Semester: II

Section(s): AE/ CE/ ME

Computer Aided Engineering Drawing

AME102

Lectures/week: 03

Course Instructor(s):

Course duration:



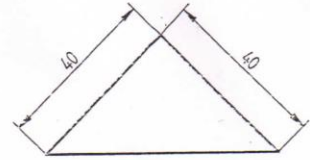
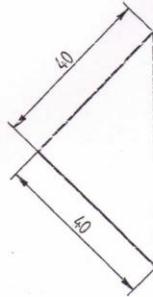
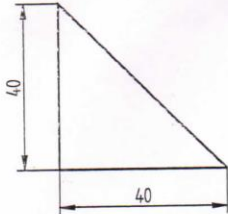
UNITS	TOPICS	Portions coverage %	
		Individual	Cumulative
1	AutoCAD: Introduction to AutoCAD: Geometrical construction DEVELOPMENT OF SURFACES WITH SECTIONAL VIEW: Sections and sectional views, sections of right regular solids, prisms, pyramids, cylinders and cones, auxiliary views, development of surfaces, development of surfaces of right regular solids prisms, pyramids, cylinders and cones.	20	20
2	INTERSECTION OF SOLIDS: Intersection of solids: Intersection of prism versus prism, cylinder versus prism, cylinder versus cylinder and cylinder versus cone.	20	40
3	ISOMETRIC PROJECTIONS: Isometric projections: Principles of isometric projections, isometric scale, isometric views, conventions. Isometric views of lines, planes, simple and compound solids, isometric views of objects having spherical parts.	20	60
4	TRANSFORMATION OF PROJECTIONS: Transformation of projections: Conversion of isometric views to orthographic views, conventions for simple objects; Construction of orthographic projections for given isometric projections.	20	80
5	PERSPECTIVE PROJECTIONS: Perspective projections: Perspective view of points, lines, plane figures and simple solids, vanishing point method and visual ray method.	20	100

Book Type	Code	Author & Title
Text Book	TB1, TB2	1. N. D. Bhatt (2012), Engineering Drawing, 49th Edition, Charotar Publications, New Delhi. 2. C.M. Agarwal, Basant Agarwal, "Engineering Drawing", Tata Mc Graw Hill, 2 nd Edition, 2013
References	RB1 RB2 RB3 RB4	1. K. Venugopal, " Engineering Drawing and Graphics". New Age Publications, 2 nd Edition, 2010. 2. Dhananjay. A. Johle, " Engineering Drawing", Tata Mc Graw Hill, 1 st Edition, 2008. 3. S. Trymbaka Murthy, " Computer Aided Engineering Drawing", I.K. International Publishers, 3 rd Edition, 2011. 4. A. K. Sarkar, A.P Rastogi, " Engineering graphics with Auto CAD", PHI Learning, 1 st Edition, 2010.
Web References		1. http://nptel.ac.in/courses/112103019 2. http://www.autocadtutorials.net/ 3. http://gradcab.com/questions/tutorial-16-for-beginner-engineering-drawing-I
E-Textbook		1. https://books.google.co.in/books?id=VRN7e09RqoC&pg=PA9&source=gbs_toc_r&cad=4#v=onepage&q&f=false

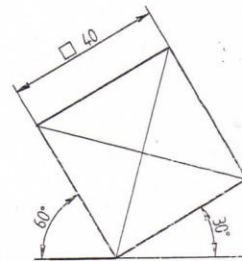
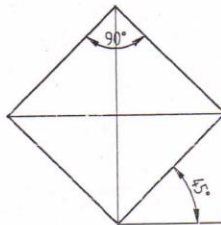
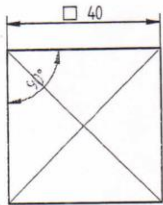
Drawing No.1 : Basic Constructions

SI/DI

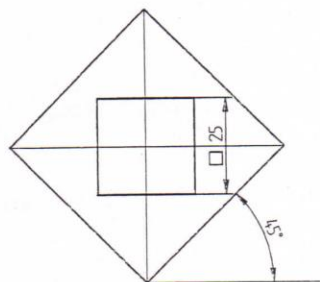
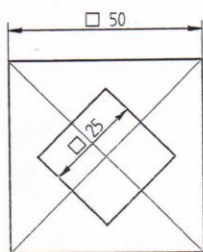
TRIANGLES



SQUARES



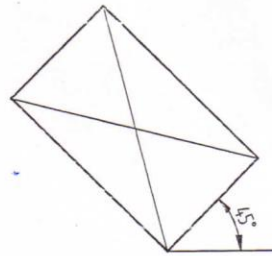
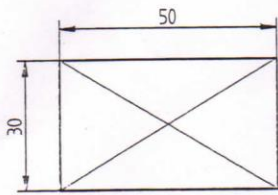
SQUARES WITH HOLES



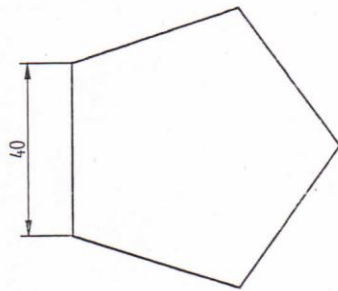
Write down the Auto CAD commands to complete the above exercise.

S2/D1

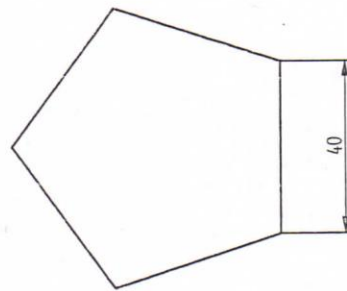
RECTANGLES



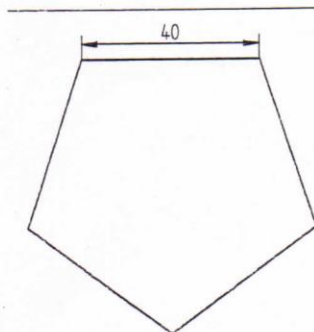
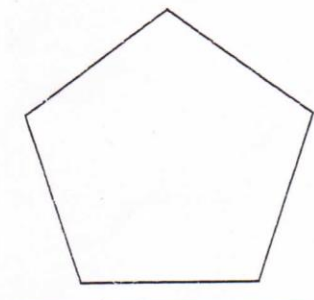
PENTAGON



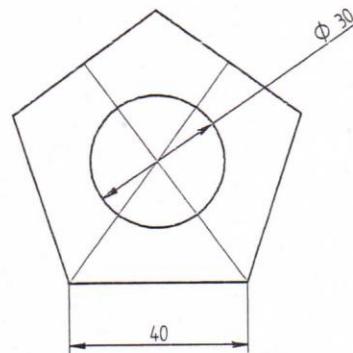
PENTAGON



MIRROR IMAGE



MIRROR IMAGE

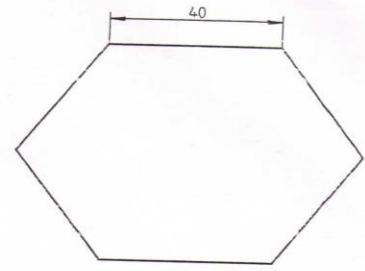
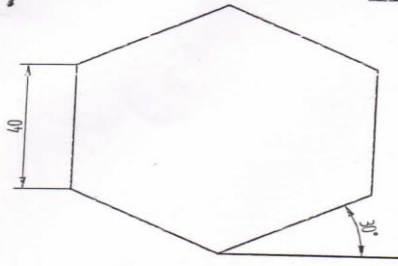


PENTAGON WITH A CIRCULAR HOLE

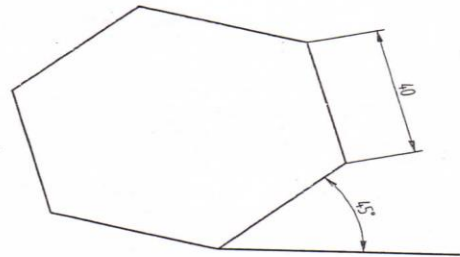
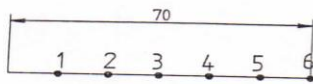
Write down the Auto CAD commands to complete the above exercise.

S3/D1

HEXAGON



DIVISION OF A LINE IN TO EQUAL PARTS



Write down the Auto CAD commands to complete the above exercise.

DEVELOPMENT OF SURFACES WITH SECTIONAL VIEW

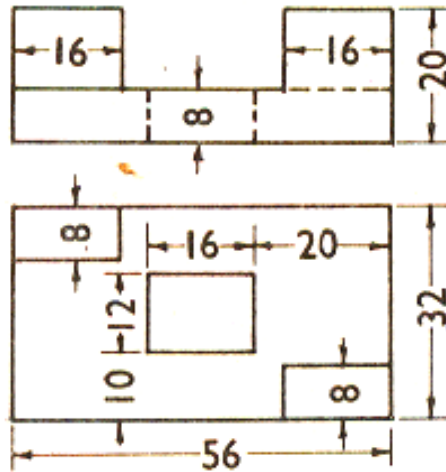
1. A Hexagonal pyramid of base 50 mm and axis 100 mm long is resting on its base with two of its side parallel to VP. It is cut by a sectional plane perpendicular to VP and inclined at 45° to HP. Sectional plane is passing through the midpoint of axis .Draw the development for the top part of the pyramid.
2. Draw the development of a cylinder of 50 mm diameter and 75 mm height, containing a square hole of 25 mm side. The sides of the hole are equally inclined to the base and the axis of the hole bisects the axis of the cylinder.
3. A cylinder, base 65 mm diameter and 90 mm long, and the base lying on the ground. It is cut by a horizontal section plane inclined 30° to the H.P and cutting the axis at a point 40 mm above the ground. Draw the development of lateral surface of cylinder.
4. A pentagonal prism, base 30 mm side and axis 60 mm long, and the base lying on the ground. It is cut by a horizontal section plane inclined 30° to the H.P and cutting the axis at a point 25 mm above the ground. Draw the development of lateral surface of cylinder.
5. A pentagonal prism having a base with 30 mm side and 70 mm long axis is resting on its base on HP. Such that one of the rectangular faces is parallel to VP. It is cut by an auxiliary inclined plane whose VT is inclined at 45° with the reference line and passes through midpoint of the axis, draw the development of the lateral surface of the prism.
6. A cube of 40 mm edge stands on one of its faces on H.P. with a vertical face making 45° to the V.P. a horizontal hole of 30 mm diameter is drilled centrally through the cube such that the hole passes through the opposite vertical edges of the cube. Obtain the development of the lateral surface of the cube with the hole.
7. A right cone with 50 mm base diameter and 60 mm axis is resting on its base in the HP, its cut by an auxiliary inclined lane parallel to and 8 mm away from the extreme generator, draw the development of the lateral surface of the remaining solid.
8. A cone, base 50 mm diameter and 70 mm long, and the base lying on the ground. It is cut by a horizontal section plane inclined 45° to the H.P and cutting the axis at a point 40 mm above the ground. Draw the development of lateral surface of cone.
9. A square pyramid with side of base 30 mm axis 50 mm long is resting on its base on H.P with on edge of the base parallel to V.P .it is cut by a sectional plane, perpendicular to V.P and inclined at 45° to H.P the sectional plane is passing through the midpoint of the axis. Draw the development of the surface cut pyramid.

INTERSECTION OF SOLIDS

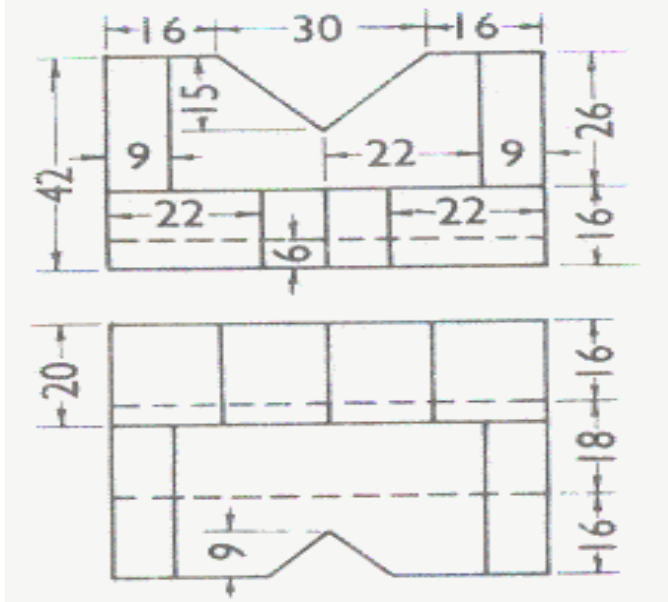
1. A vertical cylinder of 60 mm diameter and height 110 mm is penetrated by a horizontal cone of same size and same length. The axis of the horizontal cylinder is parallel to V.P and is 10mm away from the axis of vertical cylinder. Draw the projections showing the curves of intersection.
2. A vertical cylinder of 70mm diameter is penetrated by another cylinder of 45 mm diameter the axis of which is parallel to both HP and VP. The two axes are 9 mm apart. Draw the projection showing curves of intersection.
3. A vertical square prism base 50 mm side is completely penetrated by a horizontal square prism, base 35 mm side so that their axis are 6 mm apart the axis of the horizontal prism is parallel to the V.P. while the faces of both prisms are equally inclined to the V.P. Draw the projections of the prisms showing lines of intersection.
4. A vertical cylinder of 60 mm diameter is penetrated by a horizontal square prism of 35 mm side. The axes of the two solids intersect each other. A rectangular face of the prism is inclined at 60° to V.P. Draw the lines of intersection.

ISOMETRIC PROJECTIONS

1. Draw an isometric view of given figure below. (All dimensions are in mm).

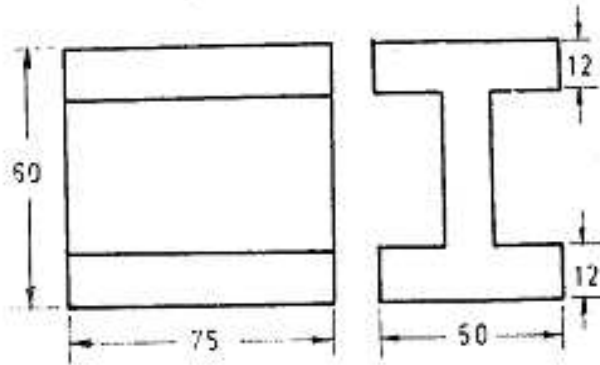


2. Draw the isometric view of given orthographic views. (All dimensions are in mm)



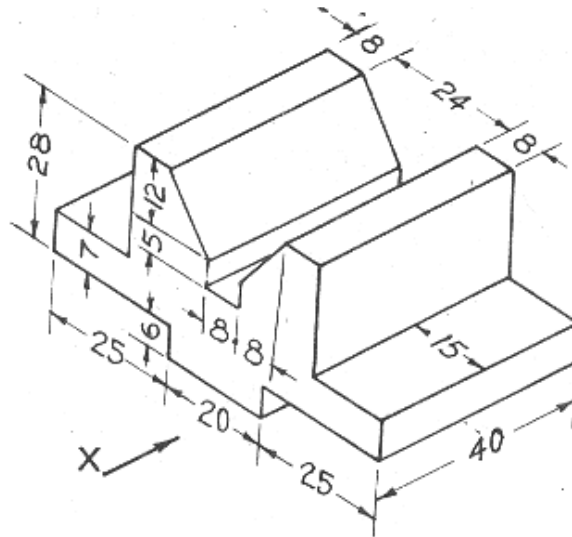
3. Draw the isometric projection of a frustum of hexagonal pyramid, side of base 30 mm the side of top base 15 mm of height 50 mm.
4. Draw the isometric view of a cone 40 mm diameter and axis 55 mm long when its axis is horizontal.
5. The outside dimensions of a box made of 5 mm thick wooden planks are 80 x 60 x 50 mm. The depth of the lid on outside is 10 mm. Draw the isometric view of the box with the lid open.
6. A cylinder of base diameter 30 mm axis 60 mm is resting centrally on a slab of 60 mm square and thickness 20 mm. Draw the isometric projection of the combination of the solids.

7. A paperweight consists of a frustum of a square pyramid, side of base 70 mm at the bottom, 40 mm at the top and 20 mm height. It is surmounted by a cylinder of 30 mm diameter with spherical knob of 40 mm diameter at the top such that the center of the sphere is at a height of 25 mm from the top of the frustum. Draw the isometric projection of the assembly.
8. Draw the isometric view of the object whose orthographic projections are given in fig. All dimensions are in mm.

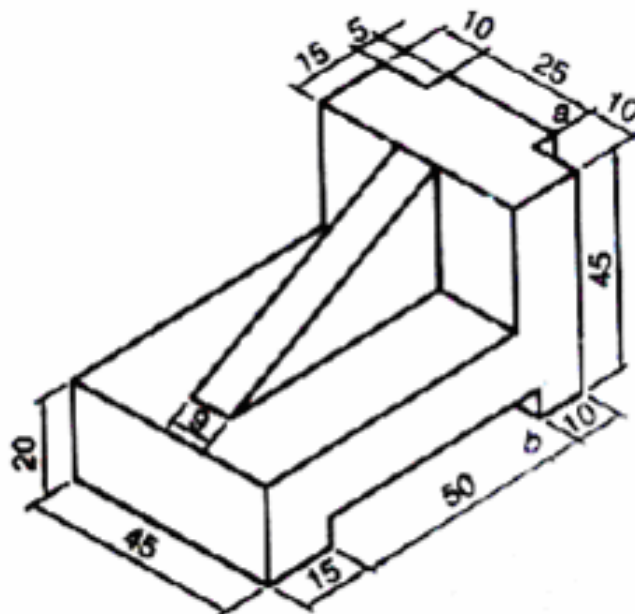


TRANSFORMATION OF PROJECTIONS

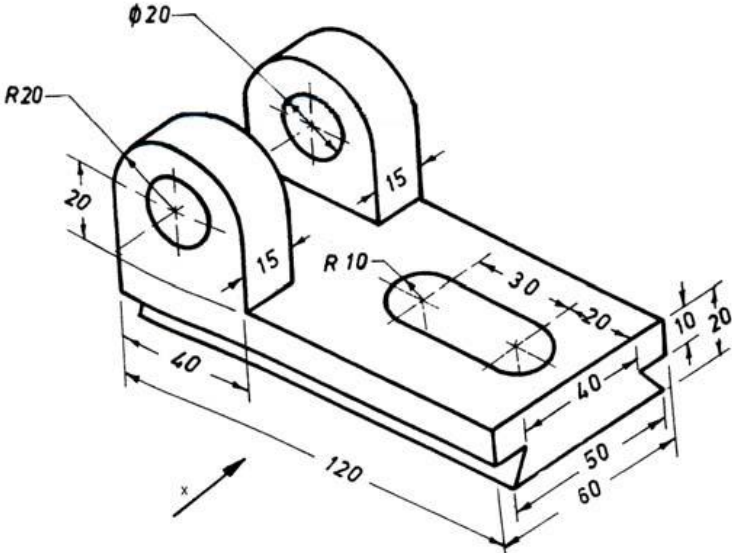
1. Draw the front view, top view and side view of the object whose isometric view is shown in the figure below (All dimensions are in mm).



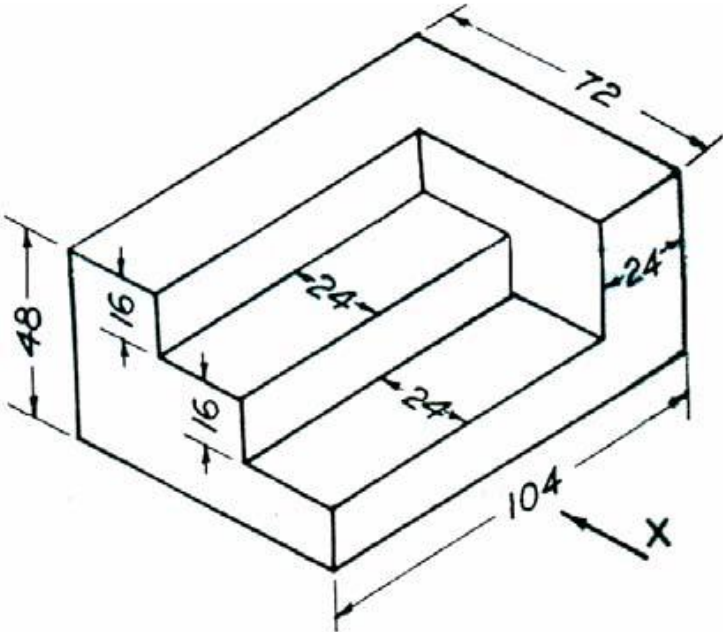
2. Draw front view, top view and side view of the model shown below:



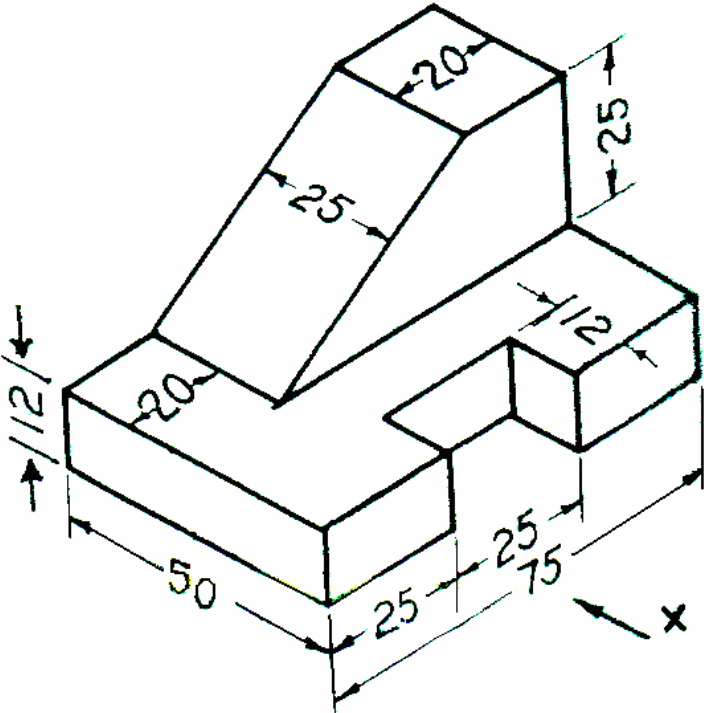
3. Draw the necessary Orthographic views for the Isometric view of the object shown below:



4. Draw front view, top view and side view of the model shown below:



5. Draw the Orthographic views of the Isometric view shown in the following figure:



PERSPECTIVE PROJECTIONS

1. A square plane with a 60 mm side lies on the GP with the edge nearer to the observer lying in the PP. The station point is 50 mm in front of PP, 60 mm above GP, and lies in a CP which is 50 mm towards right of the centre of the object. Draw its perspective view.
2. A pentagonal prism of side of base 30 mm and axis 60 mm long rests on one of its rectangular faces on the ground with a pentagonal face touching the PP. The point of sight is 60 mm to the right of the axis of the prism, 70 mm from the PP, 80 mm above the ground. Draw the perspective view of the prism.
3. A hexagonal pyramid of base 25 mm and height 60 mm is resting on the ground on its base with one side of the base parallel to and 20 mm behind PP. The station point is 60 mm above the GP and 70 mm in front of V.P and the CP lies at a distance of 25 mm to the right of the axis of the solid. Draw the perspective view of the pyramid.
4. Draw the perspective view of a square pyramid of base 100mm side and height of the apex 120mm. The nearest edge of the base is parallel to and 30mm behind the picture plane. The station point is situated at a distance of 300mm from the picture plane, 60mm above the ground plane and 200mm to the right of the apex.
5. A cube of edge 30 mm rests with one of its faces on the ground plane such that a vertical edge touches the PP. The vertical faces of the cube are equally inclined to PP and behind it. A station point is 40 mm in front of the PP, 50 mm above the ground plane and lies in a central plane 15 mm to the right of the axis of the cube. Draw the perspective view.

LIST OF ASSIGNMENT SHEETS.

Sheet. No	Topic	Reference Book	Page No	Q. No	Date of Submission	Marks
A-1	Basic Constructions	AutoCAD Manual	4,5,6	S1,S2,S3		
A-2	Development of surfaces	AutoCAD Manual	7	1,4,5		
A-3	Intersection of solids	AutoCAD Manual	8	1-4		
A-4	Isometric projections	AutoCAD Manual	9,10	2,5-8		
A-5	Transformation of projections	AutoCAD Manual	11-13	1,4,5		
A-6	Perspective projections	AutoCAD Manual	14	1-4		