

DARBHANGA COLLEGE OF ENGINEERING
DARBHANGA
COURSE FILE
OF
ENGINEERING GRAPHICS
(02 1202)



FACULTY NAME:

Dr. R. K. SINGH

MR. NAVDEEP PANDEY

MR. VISHNU SINGH

ASSISTANT PROFESSOR

DEPARTMENT

OF

MECHANICAL ENGINEERING

Time Table

DARBHANGA COLLEGE OF ENGINEERING

Semester-II & IV, Session 2017-2018

(Group A- Mechanical + Civil eng)

(Group B- Electrical & electronics+ Computer Science eng.)

Day	1(10:00-10:50am)	2(10:50-11:40am)	3(11:40-12:30pm)	4(12:30-01:20pm)	Lunch	5(01:50pm-02:40pm)	6(02:40-3:30pm)	7 (03:30-4:20pm)
Monday		Thermodynamics (CE- 2 nd yr) Navdeep Pandey			Lunch Break	B1 &B2- Engg Graphics Lab Navdeep Pandey		
Tuesday		Thermodynamics (CE- 2 nd yr) Navdeep Pandey				B3 &B4- Engg Graphics Lab Navdeep Pandey		
Wednesday		Thermodynamics (CE- 2 nd yr) Navdeep Pandey				B1 &B2- Engg Graphics Lab Navdeep Pandey		
Thursday			Thermodynamics (CE- 2 nd yr) Navdeep Pandey			B3 &B4- Engg Graphics Lab Navdeep Pandey		
Friday						B1 &B2- Engg Graphics Lab Navdeep Pandey		
Saturday			Thermodynamics (CE- 2 nd yr) Navdeep Pandey			B3 &B4- Engg Graphics Lab Navdeep Pandey		

B1- EEE Roll No. 1 to 30

B3- C.Sc Roll No. 1 to 30

B2- EEE Roll No. 31 to all

B4- C.Sc Roll No. 31 to all

CE – Civil engg.

Institute / College Name	Darbhanga College of Engineering		
Program Name	B.Tech (EEE & Cse)		
Course Code	02 1202		
Course Name	Engineering Graphics		
Lecture / Tutorial (per week)	2/0 (Labs 4)	Course Credits	5
Course Coordinator Name	Dr. R. K Singh Navdeep Pandey Vishnu Singh		

1. Scope and Objectives of the course

The scope of engineering graphics in engineering is multidimensional. This course provides the opportunity to learn both technical and behavioural aspects of the engineering. It provides the basic understanding of the drawing and different views and projections of the objects.

On successful completion of the course student will be able to,

- a) Understanding of different drawing instruments, types of lines and their applications, origin and drawing of different curves (parabola, ellipse, hyperbola).
- b) Identify different types of views and projections of point, line and plane and their applicability.
- c) Understand the projection of solids and intersection of solids with axis perpendicular.
- d) Ability to draw orthographic projections and sections of different solids will increase.
- e) Basic knowledge of CAD software for 2 dimensional drawing.

2. Textbooks

TB1 Engineering Drawing by ND Bhatt

TB2 Engineering Drawing by K. L. Narayna & P. Kannaiah

3. Reference Books

RB1 Engineering Drawing by P. S. Gill

Other reading and relevant websites

S. No.	Link of Journals, Magazines, Websites and Research Papers
---------------	--

1	http://nptel.ac.in/courses/112103019/
2	https://swayam.gov.in/courses/1370-engineering-graphics
3	https://www.youtube.com/watch?v=z4xZmBpXIzQ
4	https://www.youtube.com/watch?v=P2p6CtxOAX4
5	https://en.wikipedia.org/wiki/Engineering_drawing
6	http://nptel.ac.in/courses/105104148/

4. Course Plan

Lecture Number	Date of Lecture	Topics	Web Links for video Lecture	Text Book/ Reference Book/ Other reading material	Page numbers of Text Books
1-3		Introduction		TB1, RB1	1-20, 32-50, 101-148
		Drawing instruments, sheet layout, lines, lettering, dimensioning, engineering curves (ellipse, parabola, hyperbola, spiral)	http://nptel.ac.in/courses/112103019/		
4-6		Orthographic projection		TB1, RB1	160-218
		Projection of points, projection of straight line.	https://www.youtube.com/watch?v=z4xZmBpXIzQ		
7-8		Projection of planes	http://nptel.ac.in/courses/105104148/	TB1, RB1	232-245
9-11		Projection of solids		TB1, RB1	246-284
		(Prism, Pyramid, Cone, Cylinder) Axis inclined to one reference plane.	https://www.youtube.com/watch?v=z4xZmBpXIzQ		
Mid- Semester Exam (Syllabus covered from 1-20 lectures)					

12-14		Section of solid		TB1, RB1	285-322
		(Prism, Pyramid, Cone, Cylinder) Axis inclined to one reference plane.	http://nptel.ac.in/courses/105104148/		
15-17		Development of surface	http://nptel.ac.in/courses/112103019/	TB1, RB1	323-351
18-19		Intersection of surfaces	http://nptel.ac.in/courses/105104148/		352-385
		Axes of both solids at right angles.	https://www.youtube.com/watch?v=z4xZmBpXIzQ		
20-22		Isometric projection	http://nptel.ac.in/courses/105104148/	TB1, RB1	386-419
23- 26		Conversion of pictorial view into orthographic view- Simple cases.	http://nptel.ac.in/courses/112103019/	TB1, RB1	455-481
27-28		Introduction to computer aided drawing.	http://nptel.ac.in/courses/105104148/	TB1, RB1	560-570

Evaluation Scheme

Component 1	Mid Semester Examination	30
Component 2	Assignment Evaluation	10
Component 3	End Term Examination **	60
	Total	100

** The End term Comprehensive Examination will be held at the end of the semester. The mandatory requirement of 75% attendance in all theory classes is to be met for being eligible to appear in this component.

SYLLABUS

Topics	No. of Lectures	Weightage (%)
Introduction: drawing instruments, sheet layout, lines, lettering, dimensioning, engineering curves (ellipse, parabola, hyperbola, spiral).	3	11
Orthographic projection: Projection of points, projection of straight line.	3	11
Projection of planes	2	7
Projection of solids (Prism, Pyramid, Cone, Cylinder) Axis inclined to one reference plane.	3	11
Section of solid (Prism, Pyramid, Cone, Cylinder) Axis inclined to one reference plane.	3	11
Development of surface	3	11
Intersection of surfaces: Axes of both solids at right angles.	2	7
Isometric projection	3	11
Conversion of pictorial view into orthographic view: Simple cases.	4	13
Introduction to computer aided drawing	2	7

This Document is approved by:

Designation	Name	Signature
Course Coordinator	Dr. R. K. Singh Navdeep Pandey Vishnu Singh	
H.O.D.	Dr. R. K. Singh	
Principal	Dr. A. K. Thakur	
Date		

Evaluation and Examination Blue Print:

Internal assessment is done through quiz test, presentations, assignments and project work. Two sets of question paper are asked from each faculty and out of these two, without the knowledge of faculty, one question paper is chosen for concerned examination. Examination rules are uploaded on the student's portal. Evaluation is a very important process and the answer sheets of sessional tests, internal assessment assignments are returned back to the students.

The component of evaluations along with their weightage followed by the university is given below.

Sessional Test 1	15%
Sessional Test 2	15%
Sessional Test 3	15%
Assignments/ Quiz Tests/ Seminars	10%
End Term Examination	60%

(From amongst the three sessional tests best of two are considered)



Darbhang College of Engineering

Department of Mechanical Engineering Engineering Graphics

TUTORIAL SHEET 1

1. A curve drawn for Boyle's law ($PV = \text{constant}$) on a P-V chart has a characteristic shape of.
 - (a) ellipse
 - (b) Parabola
 - (c) Oblique hyperbola
 - (d) Rectangular hyperbola
2. The curve generated by a point on the circumference of a circle, which rolls without slipping along outside of another circle is known as
 - (a) Hypocycloid
 - (b) Epicycloid
 - (c) Cycloid
 - (d) Trochoid
3. In orthographic projections, the rays are assumed to
 - (a) Diverge from station point
 - (b) Converge from station point
 - (c) Be parallel
 - (d) None of these
4. If an object lies in third quadrant, its position with respect to reference planes will be
 - (a) In front of V.P, above H.P
 - (b) Behind V.P., above H.P.
 - (c) Behind V.P., below H.P.
 - (d) In front of V.P., below H.P.
5. If the Vertical Trace (V.T.) of a line lies 30 mm above reference line (XY), then its position will be.
 - (a) 30 mm in front of V.P.
 - (b) 30 mm behind V.P.
 - (c) 30 mm above H.P.
 - (d) 30 mm below H.P.

6. When an object is cut by a section plane parallel to H.P and perpendicular to V.P, then the sectional view of the object is obtained in
- (a) Top view
 - (b) Front view
 - (c) Left side view
 - (d) Right side view
7. Which of the following object gives a circular section, when it is cut completely by a section plane (irrespective of the angle of the section plane)
- (a) Cylinder
 - (b) Sphere
 - (c) Cone
 - (d) Circular lamina
8. The projections of the ends of a line AB are on the same projector. The end A is 30 mm below H.P. and 15 mm behind V.P. The end B is 35 mm above H.P. and 40 mm in front of V.P. Determine its true length, the traces and the inclinations with the reference planes.
9. A polygon is a plane figure having more than _____ sides.
10. What is the trace of a plane?



Darbhang College of Engineering

Department of Mechanical Engineering
Engineering Graphics

TUTORIAL SHEET 2

- Projection obtained on the vertical plane of a cut solid is called sectional.
 - Top view
 - Left- side view
 - Front view
 - Right- side view
- Intersection between a solid resting on HP and a plane inclined to HP is a _____ in the front view.
- Projection of a solid shown by three views is known as
 - Perspective
 - Orthographic
 - Isometric
 - Oblique
- The FV of a straight line will be a point if the line lies on
 - VP and perpendicular to HP
 - HP and parallel to VP
 - VP and parallel to HP
 - HP and perpendicular to VP
- A point P is 30mm below the HP & 42mm behind the VP. Draw its projection.
- A point Q is 18 mm below the HP & 18 mm in front of VP. Draw its projection.
- Two point A & B are on the HP the point A is 12mm in front of VP. While the point B is behind the VP. Distance between their projectors is 75 mm. Draw its projection & determine distance of B with VP if the line joining their TV makes an angle of 45° with the reference line.
- Line AB, 100 mm long, is 30° and 45° inclined to HP and VP respectively. End A is 10 mm above HP and its VT is 20 mm below HP. Draw projections of the line and it's HT.
- A 90mm long line PQ inclined at 30° to the HP and 45° to the VP has the end P 15mm above HP and 25 mm in front of VP. In which angle, the other end will lie?
- A line AB 100 mm long is inclined at 50° to HP. The end A is 10mm above the HP and end B is 65mm in front of the VP. Draw the projections of the line if its FV measures 90mm. Locate traces and the inclination of the line with the VP.



Darbhangha College Of Engineering, darbhanga

(Established under AICET Act, _____)

Department of Mechanical Engineering 02 1202 Engineering Graphics

Assignment I

11. Why The Drawing is called the Language of Engineers? Explain briefly.
12. What Are Different Methods Of Dimensioning?
13. Name The Principal Planes Of Projection.
14. What are the different types of drawing instruments used in the drawing?
15. Explain the layout of different the different types of sheets.
16. What are the different types of lines? Also explain their application briefly.
17. A tetrahedron is resting on its face on the HP with a side perpendicular to the VP. What will be its front view?
18. Write down the two major differences between first angle and third angle of projections.
19. Why do we not use second and fourth angle of projections?
20. What do you mean by single stroke letters?



**Department of Mechanical Engineering
02 1202 Engineering Graphics**

Assignment II

1. Draw the projections of a 75mm long straight line in the following positions:
 - a) Parallel to both the HP and VP and 25 mm from each.
 - b) Parallel to and 30mm above HP and in the VP.
 - c) Perpendicular to the HP, 20mm in front of VP and its one end 15mm above HP.
2. A 100 mm long line is parallel to and 40 mm above the HP. Its two ends are 25mm and 50mm in front of the VP respectively. Draw its projections and find its inclination with VP.
3. Top view of a 75mm long line measures 55mm. The line is in the VP, its one end being 25mm above the HP. Draw its projections.
4. Draw the projection of the plane which is perpendicular to VP and parallel to HP.
5. Draw the projection of the plane which is inclined to VP and perpendicular to HP.
6. A circular plate of negligible thickness & 80mm dia. Appears as an ellipse in the FV so its surface will be inclined to which plane?
7. A section plane perpendicular to HP and parallel to VP intersects a rectangular prism. Draw it FV and TV.
8. A section plane perpendicular to HP and inclined to VP intersects a rectangular prism. Draw it FV and TV.
9. Draw the projection of (i) a cylinder with dia. 40mm and axis 50mm long (ii) a cone base dia. 40 mm and axis 50mm long, resting on HP on their respective bases.
10. A cube of 50 mm long edges is resting on the HP with its vertical faces equally inclined to VP. Draw its projections.

Previous year question papers

Code : 021202

(2)

akubihar.com

akubihar.com

2 0 1 3

ENGINEERING GRAPHICS

Time : 3 hours

Full Marks : 70

Instructions :

- (i) All questions carry equal marks.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt any **FIVE** questions.
- (iv) Question No. 1 is compulsory.

1. Answer the following questions (any seven) :

- (a) Write down two major differences between orthographic projections and isometric projections.
- (b) A straight line is inclined with both HP and VP. $\theta + \phi = 90^\circ$. What is the commonality between front view and top view?
- (c) Why do you not use second and fourth angles of projections (show at least two reasons)?
- (d) Describe the functions of the following AutoCAD commands :
 - (i) ISOPLANE
 - (ii) TRIM
- (e) What is the nature of lateral surface of a cylinder?

AK13—1200/358 akubihar.com (Turn Over)

- (f) A sphere in isometric projection appears as a circle. What is the value of diameter of the circle?
- (g) A 90 mm long line PQ, inclined at 30° to the HP and 45° to the VP, has the end P 15 mm above HP and 25 mm in front of VP. In which angle, the other end will lie?
- (h) A tetrahedron is resting on its face on the HP with a side perpendicular to the VP. What will be its front view?
- (i) A triangular prism is resting on a rectangular face in the HP. It is cut by a horizontal plane. What will be the shape of the sectional top view?
- (j) A vertical cylinder is penetrated by a horizontal cylinder. What will be the top view of the curve of intersection?

2. A link 150 mm long swings on a pivot from its vertical position of rest to the right, through an angle of 35° . After its swing to the left through an angle of 70° , it returns to its initial position. During this period, a fly travels from top to bottom of the link at a uniform speed along the centre line of the link. Trace the path of the fly.
3. A line AB, 100 mm long, is inclined at 50° to HP. The end A is 10 mm above the HP and end B is 65 mm in front of the VP. Draw the projections of the line if its FV measures 90 mm. Locate traces and the inclination of the line with the VP.

AK13—1200/358 (Continued)

(3)

akubihar.com

4. A pentagonal prism of base side 30 mm and axis length 60 mm is resting on HP on one of its base corners with its axis inclined at 40° to HP and parallel to VP. Draw its projections when the base sides containing the resting corner are equally inclined to HP.
5. A pentagonal prism with a 25 mm base-side and 70 mm height is resting on its base on the HP with a side of base inclined at 40° to the VP. An AIP inclined at 65° to the HP and passing through the midpoint of the axis cuts the prism. Draw the front view, sectional top view, sectional side view and the true shape of the section.
6. Hexagonal prism of base side 30 mm and axis length 60 mm is resting on HP on its base with two of its vertical faces perpendicular to VP. It is cut by a plane inclined at 50° to HP and perpendicular to VP and meets the axis of prism at a distance 10 mm from the top end. Draw the development of the lateral surface of the prism.
7. A vertical square prism of base side 35 mm is penetrated by a horizontal square prism of base side 20 mm. The axis of the horizontal prism is 5 mm in front of the vertical prism axis and is parallel to VP. Draw the projections of the prisms showing the lines of intersection when the faces of the prism are equally inclined to VP.

AK13—1200/358

(Turn Over)

(4)

8. Draw the front view, top view and left-hand side view of the following object (Fig. 1).

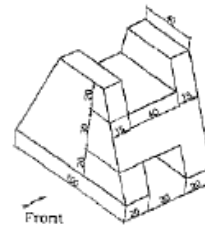


Fig. 1 akubihar.com

9. Draw the isometric view from the following orthographic views (Fig. 2).

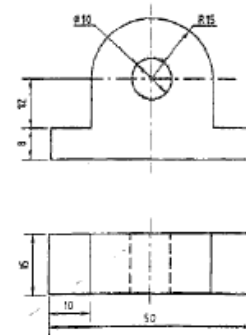


Fig. 2

AK13—1200/358

akubihar.com

Code : 021202

B.Tech. 2nd Semester Exam., 2014

ENGINEERING GRAPHICS

Time : 3 hours

Full Marks : 70

Instructions :

- All questions carry equal marks.
- There are **NINE** questions in this paper.
- Attempt **FIVE** questions in all.
- Question No. 1 is compulsory.

1. Answer the following questions (any seven).

- Write down two major differences between first angle and third angle of projection.
- A circular lamina is perpendicular on VP and top view is a straight line. What will be its front view and side view?
- Write down two main roles of key/critical points in describing intersection of surfaces.
- Write down two major differences between isometric view and isometric projections.
- What is an Archimedean spiral?

14AK-1700/523

akubihar.com

akubihar.com

(3)

- A pentagonal pyramid of base 20 mm and height 50 mm has its triangular face in the VP with a shorter side inclined to the HP at 30° . Draw its projections.
- A square prism, base 45 mm, side axis 90 mm long, stands on the HP with its axis vertical, such that its faces are equally inclined to the VP. The prism is cut by a plane, perpendicular to the VP, inclined at 60° to the HP and passing through a point on the axis of the prism 65 mm above the HP. Draw its projections and the true shape of the section.
- A pentagonal prism of base side 30 mm and axis length 60 mm is resting on HP on its base with a side of base parallel to VP. It is cut by a plane inclined at 35° to HP and perpendicular to VP and meets the axis at a distance 35 mm from the base. Draw the development of the lower portion of the prism.
- A right circular cone of base diameter 80 mm and altitude 90 mm has its base horizontal. A cylinder of diameter 40 mm with its axis horizontal and 30 mm above the base of the cone penetrates the cone, the axes are intersecting at right angles. Show the curves of intersection in the plan and elevation.

akubihar.com

(2)

- Describe the possible position of a triangular lamina so that projection of the triangular lamina will be a straight line in first angle of projection.
- Show the various positions of cutting planes passing through a right regular cone so that (i) parabola, (ii) ellipse, (iii) hyperbola and (iv) circle may be obtained.
- Describe the functions of the following AutoCAD commands :
 - PLINE
 - ARRAY
- If a semicircular thin sheet is folded to form a cone, then how will the front view of the cone appear?
- If the apparent and the true inclinations of a line with HP are equal, then what will be the position of line?

- Construct a parabola when the distance between the focus and directrix is 30 mm. Draw the tangent and normal at any general point on the curve.

- A straight line CD is inclined at 30° to the VP and 45° to the HP. Its LHSV measures 45 mm. The midpoint P of the line is 55 mm in front of the VP and 50 mm above the HP. Draw the three views of the line and find its true length.

akubihar.com

(4)

akubihar.com

- Draw the front view, top view and left-hand side view of the following object (Fig. 1).

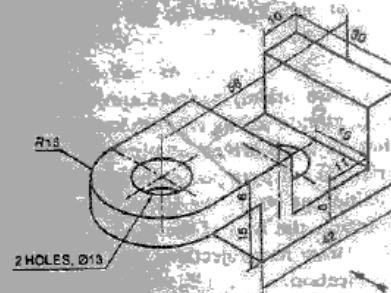


Fig. 1

- Draw the isometric view from the following orthographic views (Fig. 2).

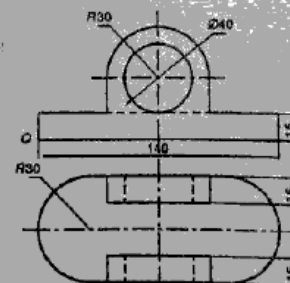


Fig. 2

14AK-1700/523

Code : 021202

ENGINEERING GRAPHICS

Time : 3 hours

Full Marks : 70

Instructions :

- The marks are indicated in the right-hand margin.
- There are **NINE** questions in this paper.
- Attempt **FIVE** questions in all.
- Question No. 1 is compulsory.

1. Choose the correct option (any seven) : $2 \times 7 = 14$

- The size of B2 drawing board recommended by Bureau of Indian Standard is
 - 500 mm \times 700 mm
 - 400 mm \times 300 mm
 - 200 mm \times 100 mm
 - 50 mm \times 25 mm
- Projection of an object shown by three views is known as
 - perspective
 - isometric
 - oblique
 - orthographic

AK16/299

(Turn Over)

(c) In third angle projection method, what are the relative positions of the object, plane and observer?

- Object is placed in between
- Plane is placed in between
- Observer is placed in between
- May be placed in any order

(d) Top view is projected on the

- vertical plane
- corner plane
- side plane
- horizontal plane

(e) Section lines are generally inclined with the base at an angle of

- 30°
- 45°
- 60°
- 90°

(f) If a plane is parallel to the plane of projection, it appears

- true size
- as a line or edge
- foreshortened
- as an oblique surface

AK16/299

(Turn Over)

AK16/299

(Continued)

(a) The FV of a straight line will be a point, if the line lies on

- VP and perpendicular to HP
- HP and parallel to VP
- VP and parallel to HP
- HP and perpendicular to VP

(b) Which one is the reduce scale?

- 1 : 1
- 5 : 1
- 10 : 1
- 1 : 2

(c) In isometric projection the three edges of an object are inclined to each other at

- 60°
- 120°
- 100°
- 90°

(d) Which software is generally used in the computer for drafting?

- ANSYS
- Pro/Engineer
- AutoCad
- CATIA

AK16/299

(Turn Over)

AK16/299

akubihar.com

(Continued)

2. A ball thrown in air attains 100 m height and covers a horizontal distance of 150 m on ground. Draw the path of the ball (projectile). 14

3. Line AB, 100 mm long, is 30° and 45° inclined to HP and VP respectively. End A is 10 mm above HP and its VT is 20 mm below HP. Draw projections of the line and its HT. 14

4. A circle of 50 mm diameter is resting on HP on end A of its diameter AC which is 30° inclined to HP while it makes 45° inclined to VP. Draw its projections. 14

5. A cube of 50 mm long edges is so placed on HP on one corner that a body diagonal is parallel to HP and perpendicular to VP. Draw its projections. 14

6. A cone, 50 mm base diameter and 70 mm axis, is standing on its base on HP. It is cut by a section plane 45° inclined to HP through base end of end generator. Draw projections, sectional views and true shape of the section. 14

7. A hexagonal prism, 30 mm base side and 55 mm axis, is lying on HP on its rectangular face with axis being parallel to VP. It is cut by a section plane normal to HP and 30° inclined to VP bisecting axis. Draw projections and development of surfaces of the remaining solid. 14

AK16/299

(Turn Over)

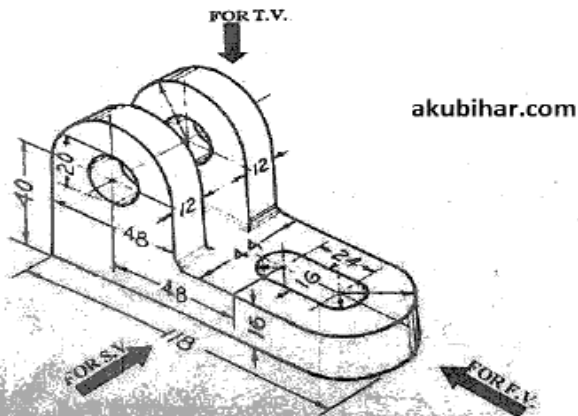
AK16/299

akubihar.com

(Continued)

8. A square pyramid of 40 mm base sides and 60 mm axis is cut by an inclined section plane (at 45° with respect to the base) through the midpoint of the axis. Draw isometric view of the section of the pyramid. 14

9. Pictorial presentation of an object is given below :



Draw three views of this object by first angle projection method. 14
