Machine Drawing

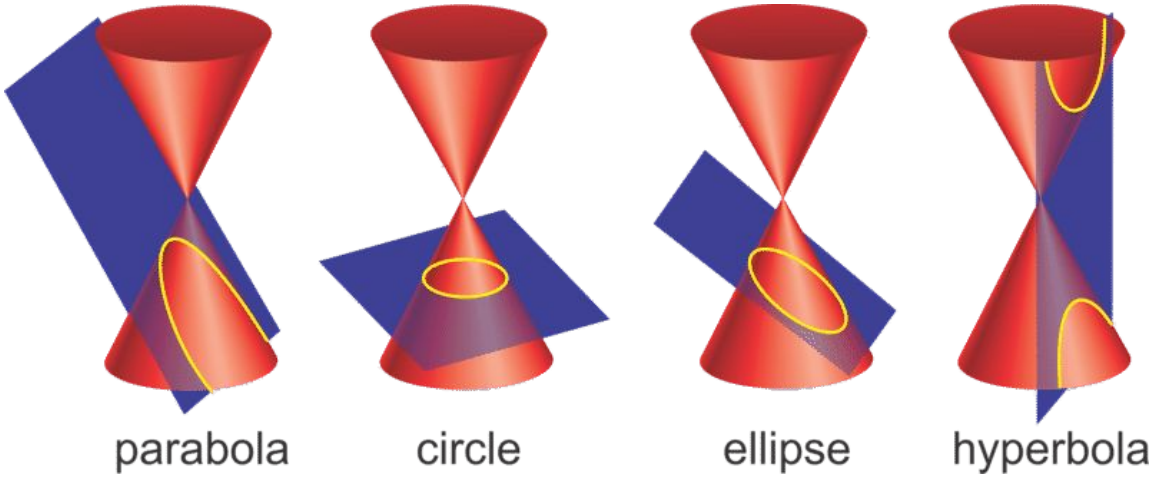
Class 1 : Introduction

Textbooks and References

- ***Textbook:***
  - ***N. D. Bhatt, Engineering Drawing – Plane and Solid Geometry, 51st Edition, 2012; Charotar Publishing House Private Limited, Anand, Gujarat 388 001, INDIA***

- ***References:***
  - ***N. Sidheswar, P. Kanniah and V.V.S. Sastry, Machine Drawing, Tata McGraw Hill, 2001***
  - ***SP 46: 1988 Engineering Drawing Practice for School & Colleges. Bureau of Indian Standards***

Conic Sections: Ellipse, Parabola and Hyperbola



Cycloid, Trochoid, Involute, Helix, and Spirals

Assignment 1

1. Construct the “inferior trochoid” and “superior trochoid” for the above generating circle with points lying 10 mm inside and outside of the circumference respectively. (book pg. 119)
2. Construct the “Archimedean spiral” having the largest and smallest radii as 50 mm and 14 mm respectively with convolution = 1.5 (book pg. 134)
3. Construct a “cycloid” with the generating circle diameter of 50 mm. (book pg. 117)
4. Construct a “parabola” with base of 60 mm and height of 80mm. (Book page : 111 – Method 1 (Rectangle method).
5. Construct an “ellipse” with major axis as 100 mm and minor axis as 70 mm (book pg.105 – Concentric circles method and Rhombus method).

Page Layout

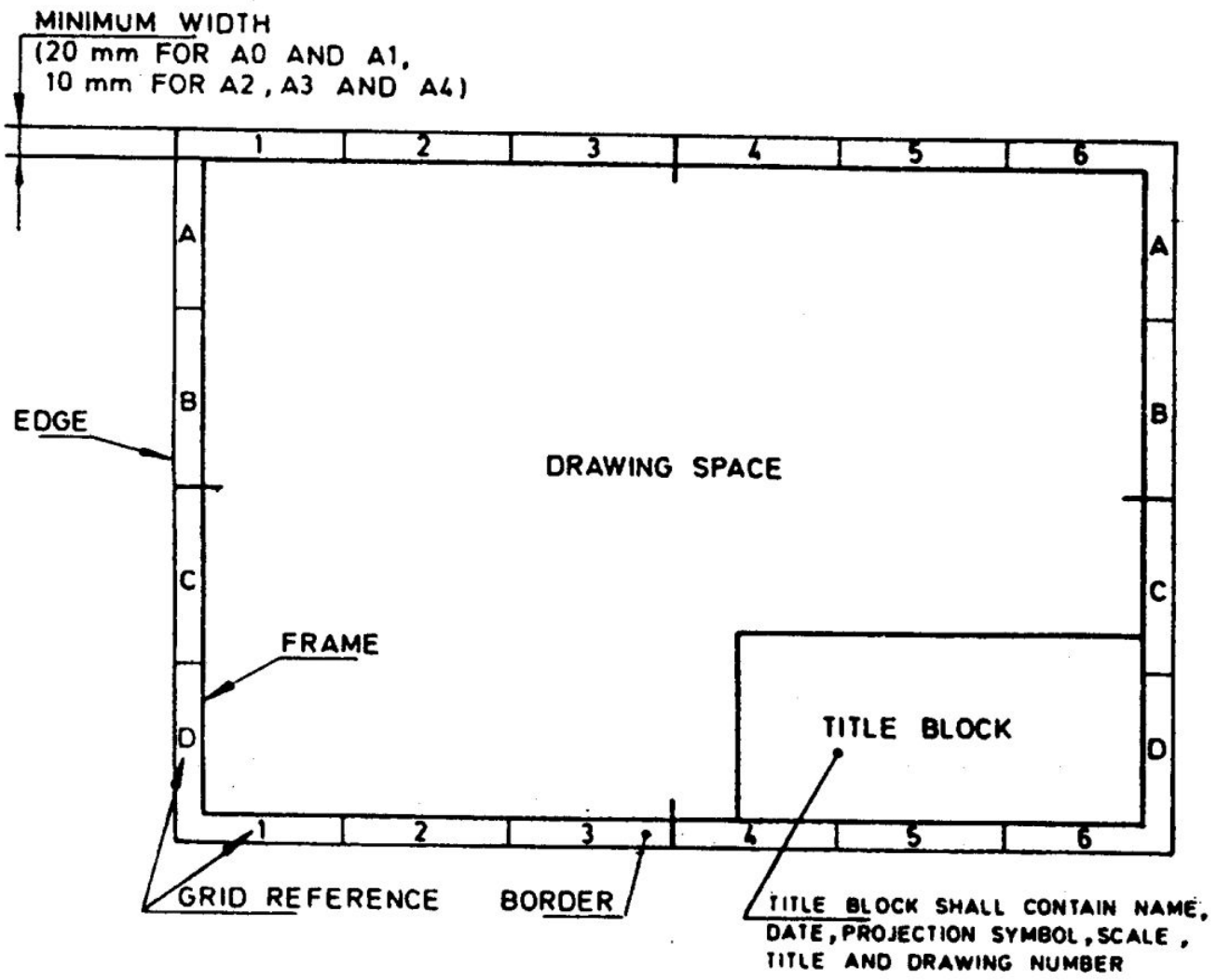

MINIMUM WIDTH
(20 mm FOR A0 AND A1,
10 mm FOR A2, A3 AND A4)
1
2
3
4
5
6
A
B
C
D
EDGE
DRAWING SPACE
FRAME
TITLE BLOCK
GRID REFERENCE
BORDER
TITLE BLOCK SHALL CONTAIN NAME,
DATE, PROJECTION SYMBOL, SCALE,
TITLE AND DRAWING NUMBER

Table 2.1 Item List
(*Clause* 2.2)

Item	Quantity	Description	Reference	Material
1	1	Base		
2	1	Bottom housing		
3	1	Top housing		
4	1	Bearing		
5	1	Filling plug		
6	2	T-bolt		
7	2	Hex nut		
8	4	Washer		
9	2	T-bolt		
10	2	Castle nut		
11	2	Split pin		
12	1	Drain plug		

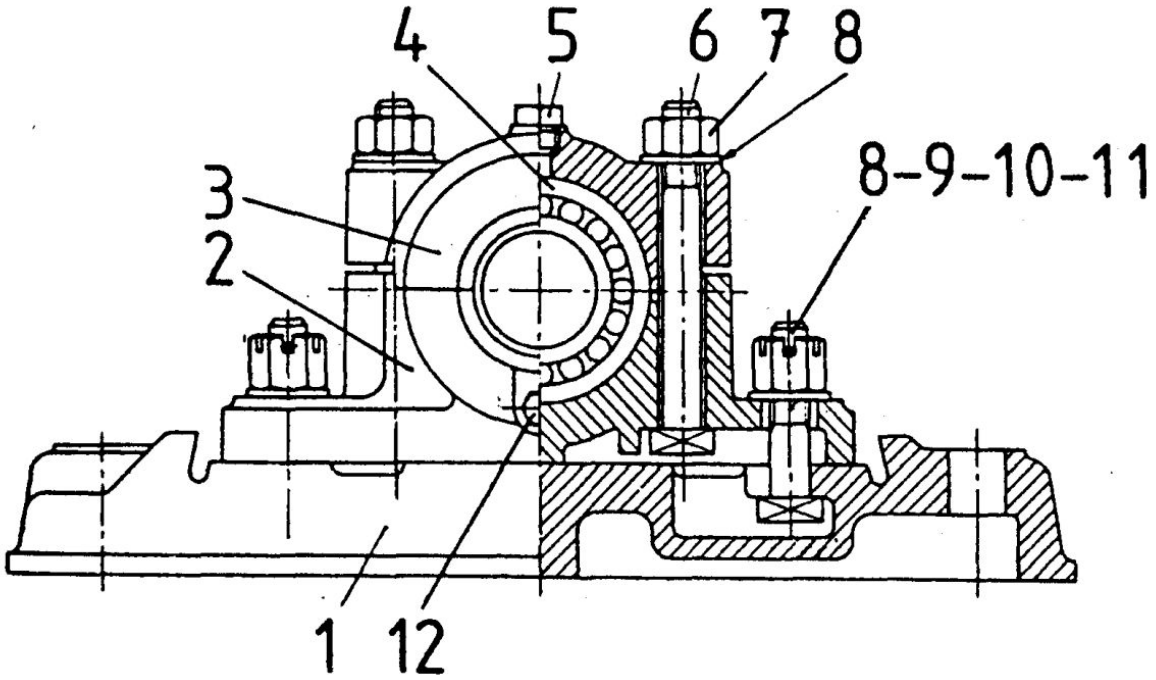
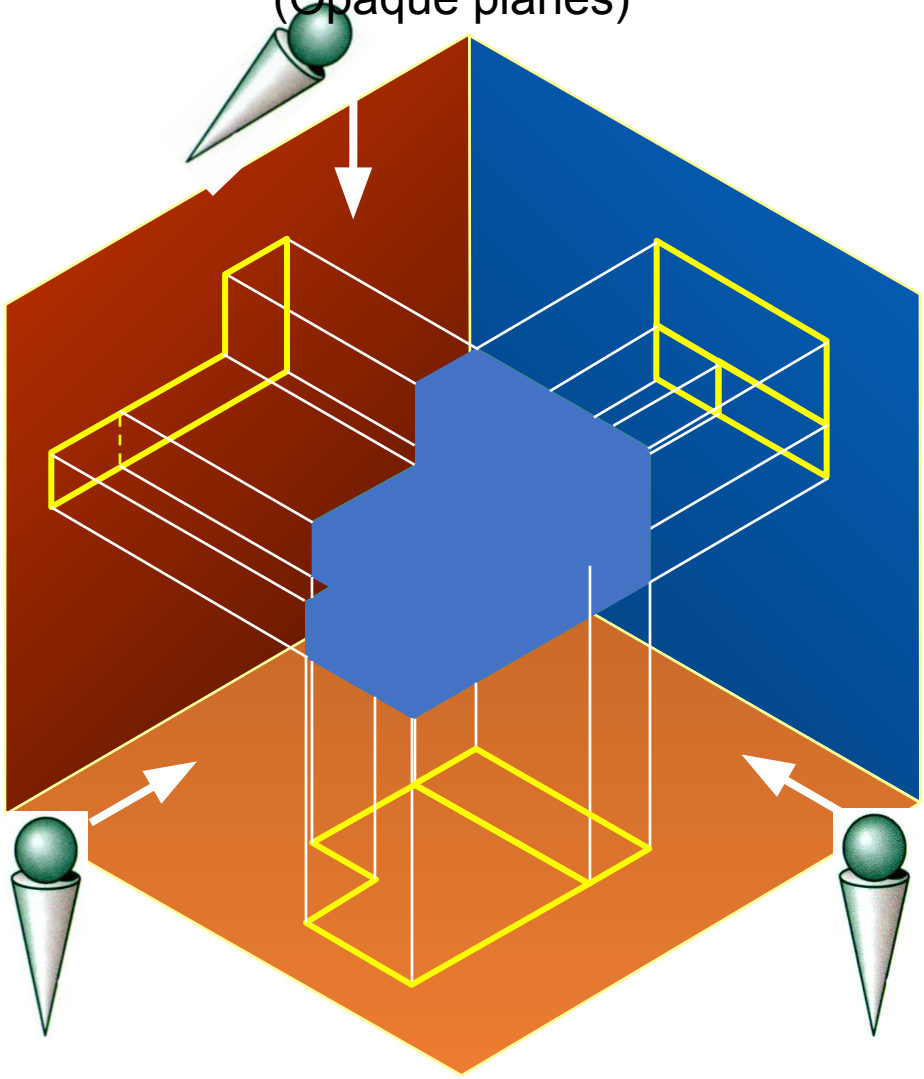


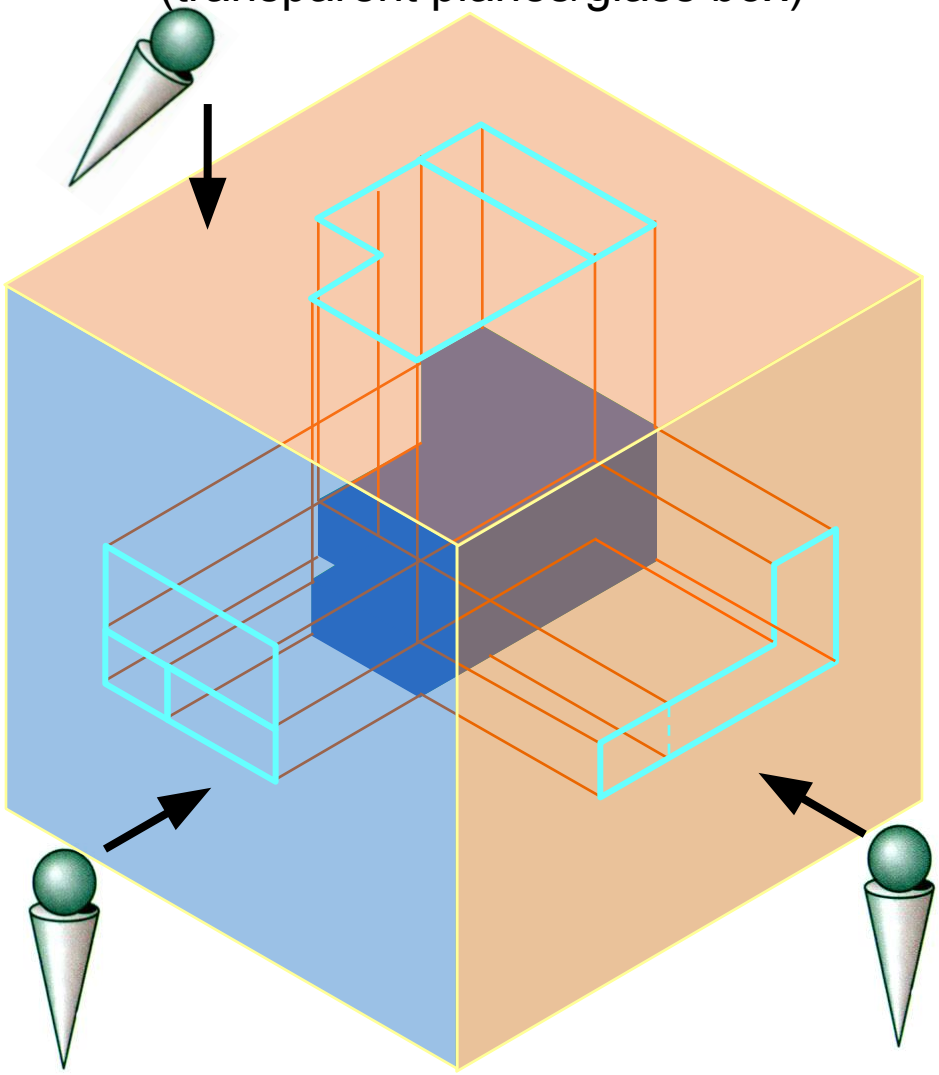
FIG. 2.1

Orthographic views

1st angle system
(Opaque planes)



3rd angle system
(transparent planes/glass box)



1st angle projection system

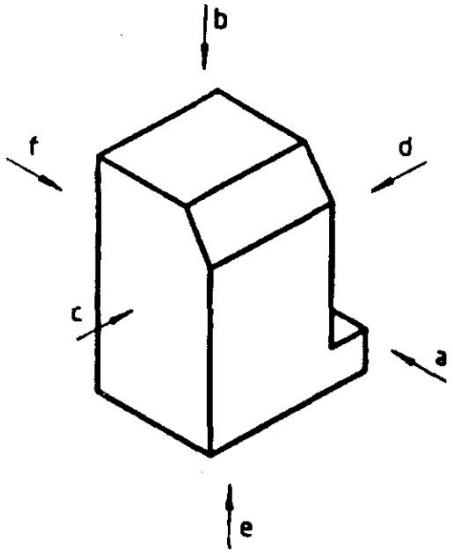


FIG. 8B.1

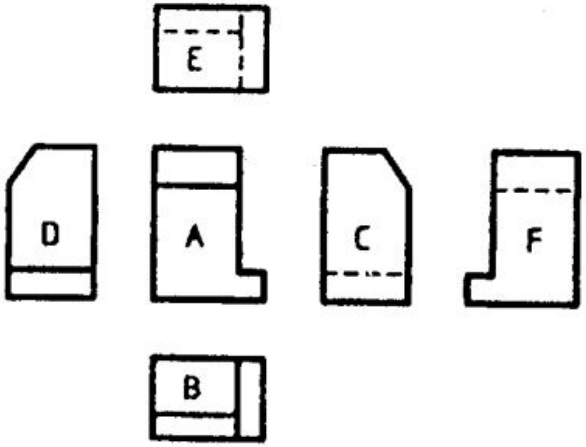


FIG. 8B.3

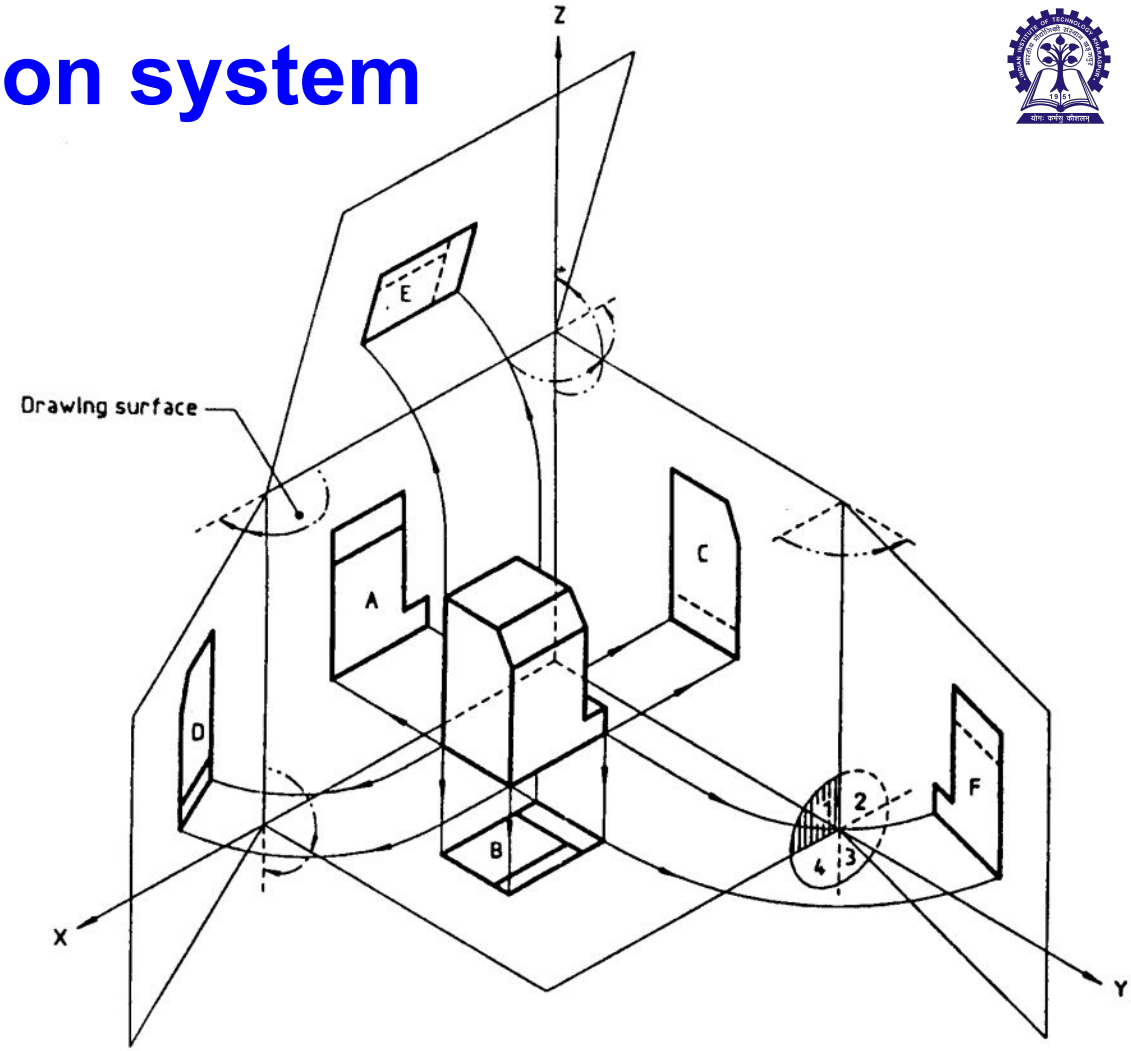


FIG. 8B.2

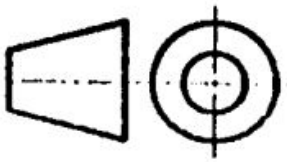
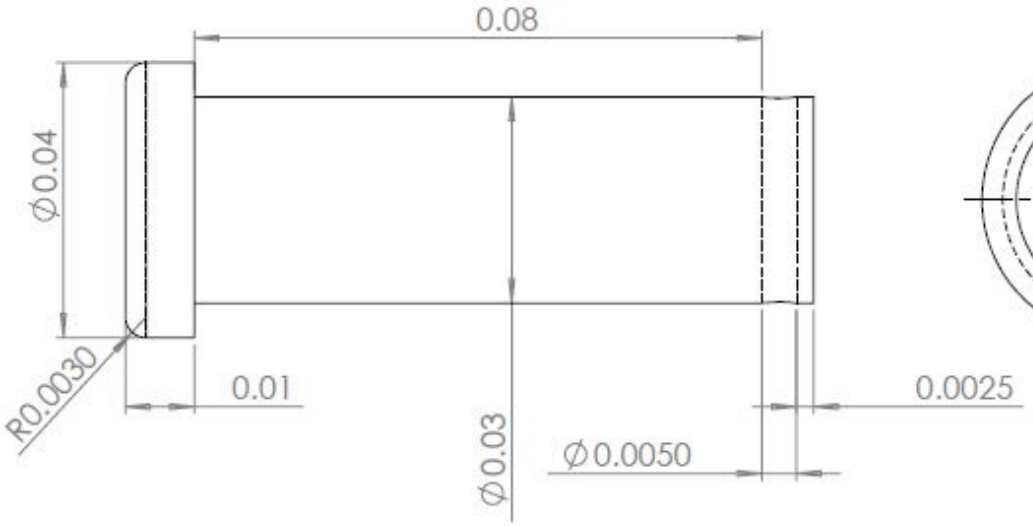
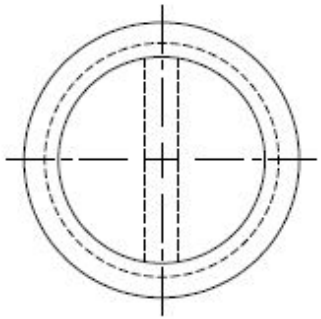
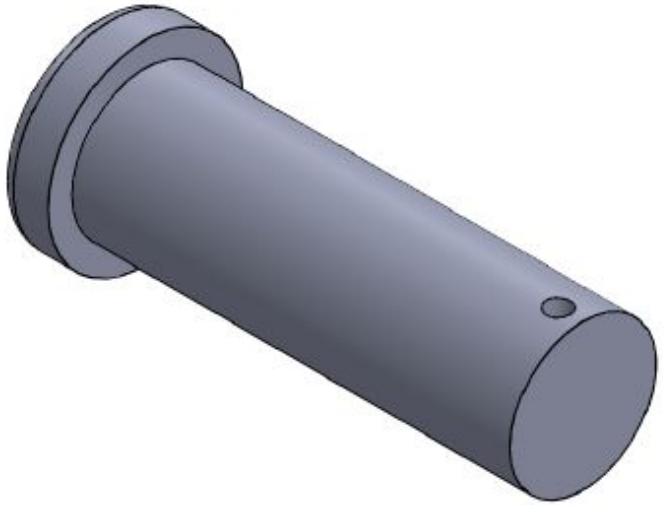


FIG. 8B.4







UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH:			DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION
	NAME	SIGNATURE	DATE			TITLE:	
DR	Mahendra R V						
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL:		DWG NO. Main pin	A4
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1

Screwed Fasteners

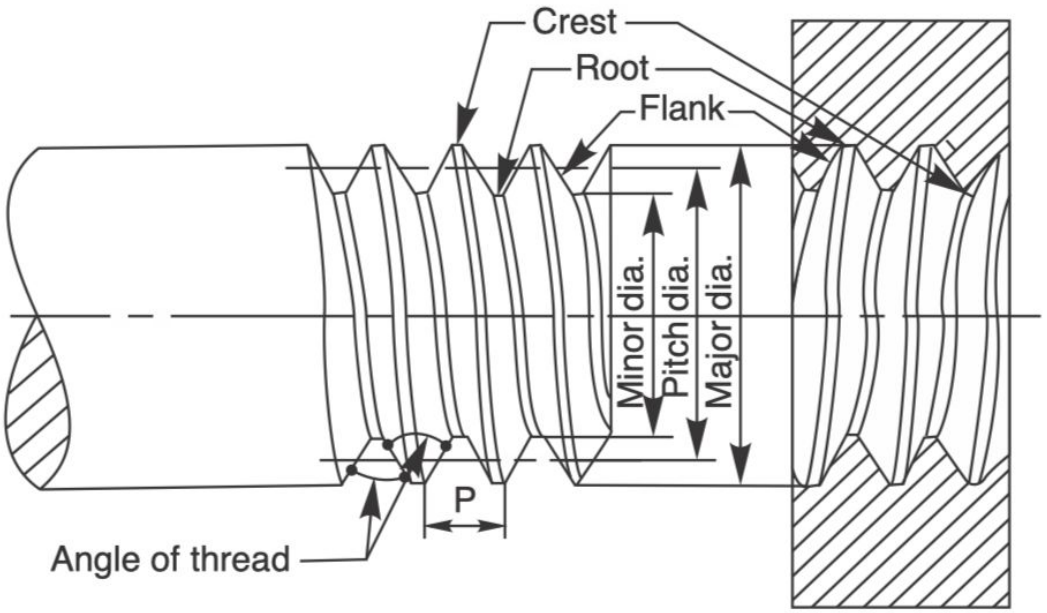
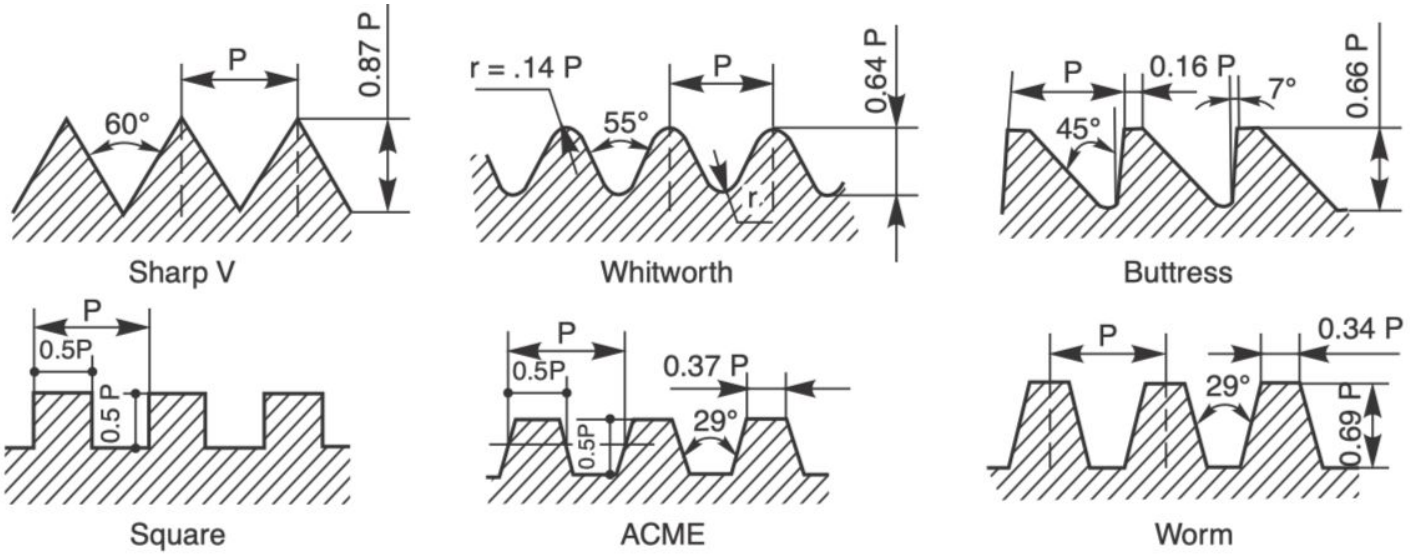
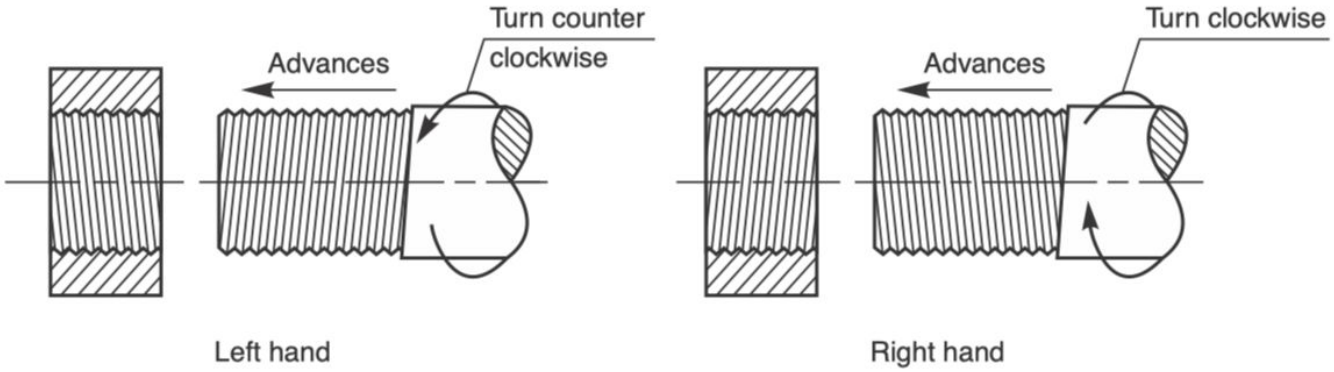


Fig. 5.1 Screw thread nomenclature

Thread Types



Right hand and Left hand Threads



Thread Designation

M 10 X 1.25

Nominal dia 10mm

Pitch 1.25 mm

M 10

Nominal dia 10mm

Pitch 1.5 mm

Table 5.1 Diameter-pitch combination for ISO metric threads

Nominal diameter		*Pitch*			
First choice	*Second choice*	*Coarse*	*Fine*		
			1	*2*	*3*
2	—	0.4	0.25	—	
—	2.2	0.45	0.25	—	—
2.5	—	0.45	0.35	—	—
3	—	0.5	0.35	—	—
—	3.5	0.6	0.35	—	—
4	—	0.7	0.5	—	—
—	4.5	0.75	0.5	—	—
5	—	0.8	0.5	—	—
6	—	1	0.75	0.5	—
8	—	1.25	1	0.75	—
10	—	1.5	1.25	1	0.75
36	39	4	3	2	1.5
42	45	4.5	4	3	2
48	52	5	4	3	2
56	60	5.5	4	3	2
64	68	6	4	3	2
72	76	6	4	3	2
80	85	6	4	3	2
90	95	6	4	3	2
100	—	6	4	3	2
105 to 300	—	—	6	4	3

Thread Representation

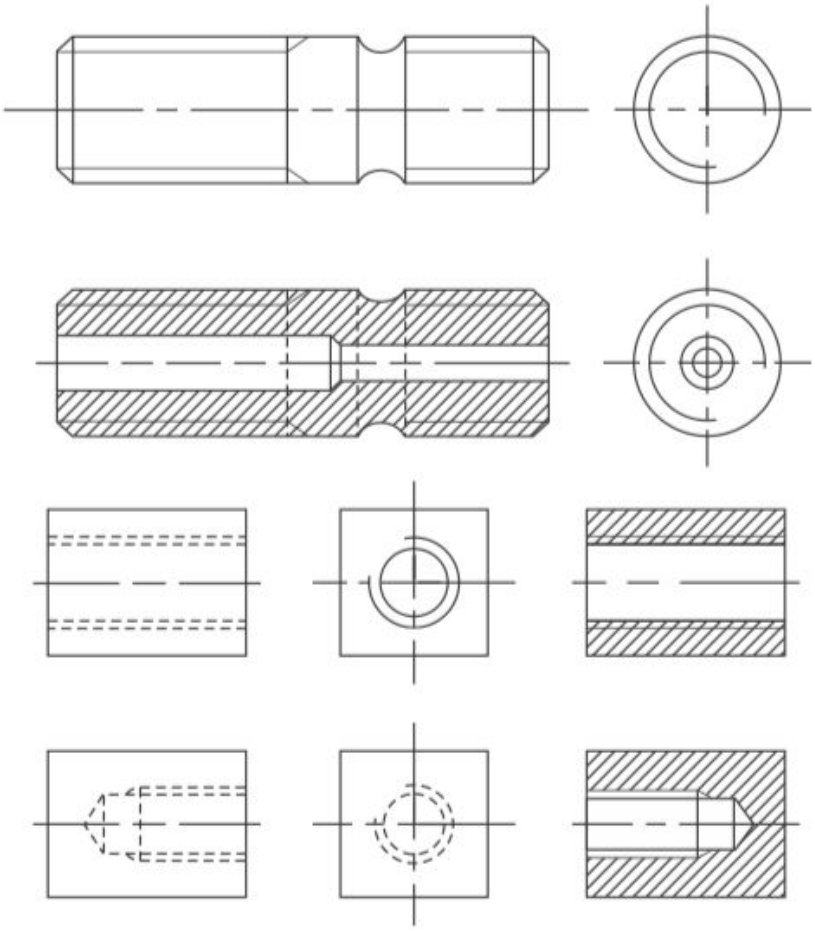
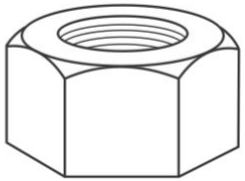


Fig. 5.7 Conventional representation of threads

Hexagonal and Square Nut



Empirical relations :

Major or nominal diameter of bolt = D

Thickness of nut, T = D

Width of nut across flat surfaces, W = 1.5D + 3 mm

Radius of chamfer, R = 1.5D

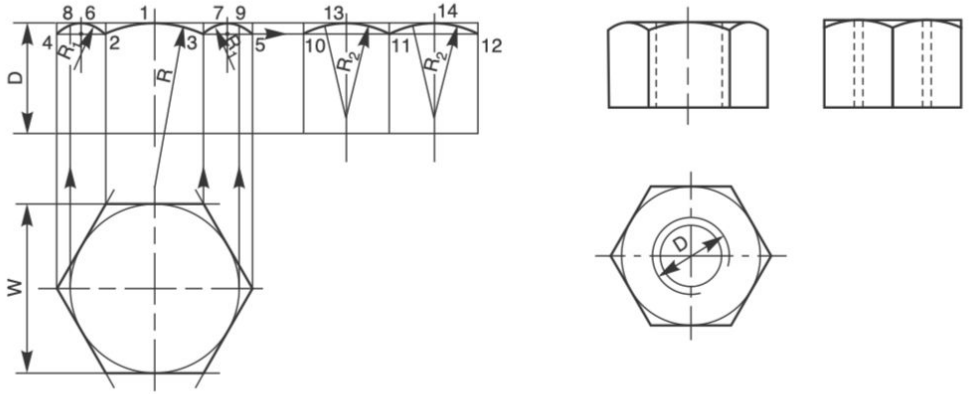


Fig. 5.12 Method of drawing views of a hexagonal nut (Method I)

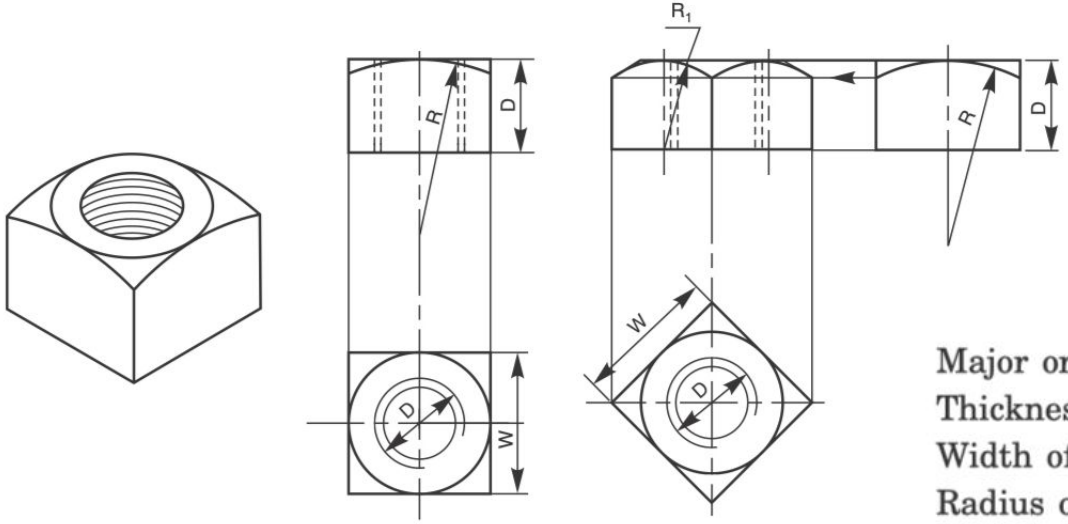


Fig.5.14 Method of drawing the views of a square nut

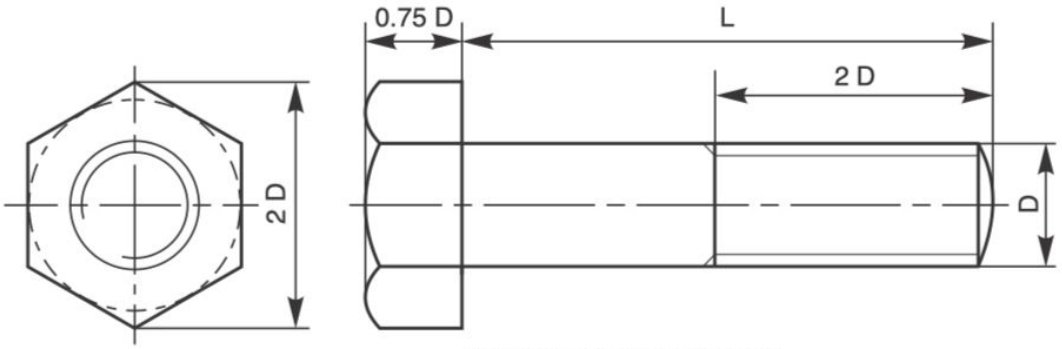
Major or nominal diameter of bolt = D

Thickness of nut, T = D

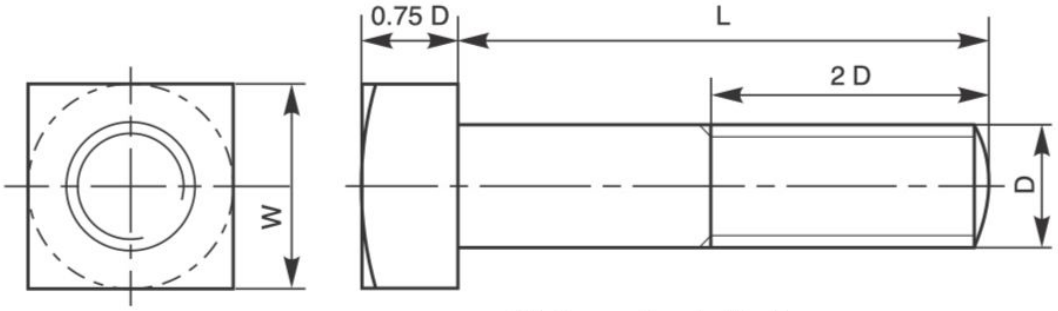
Width of the nut across flats, W = 1.5 D + 3 mm

Radius of chamfer arc, R = 2 D

Hexagonal and Square Headed Bolt



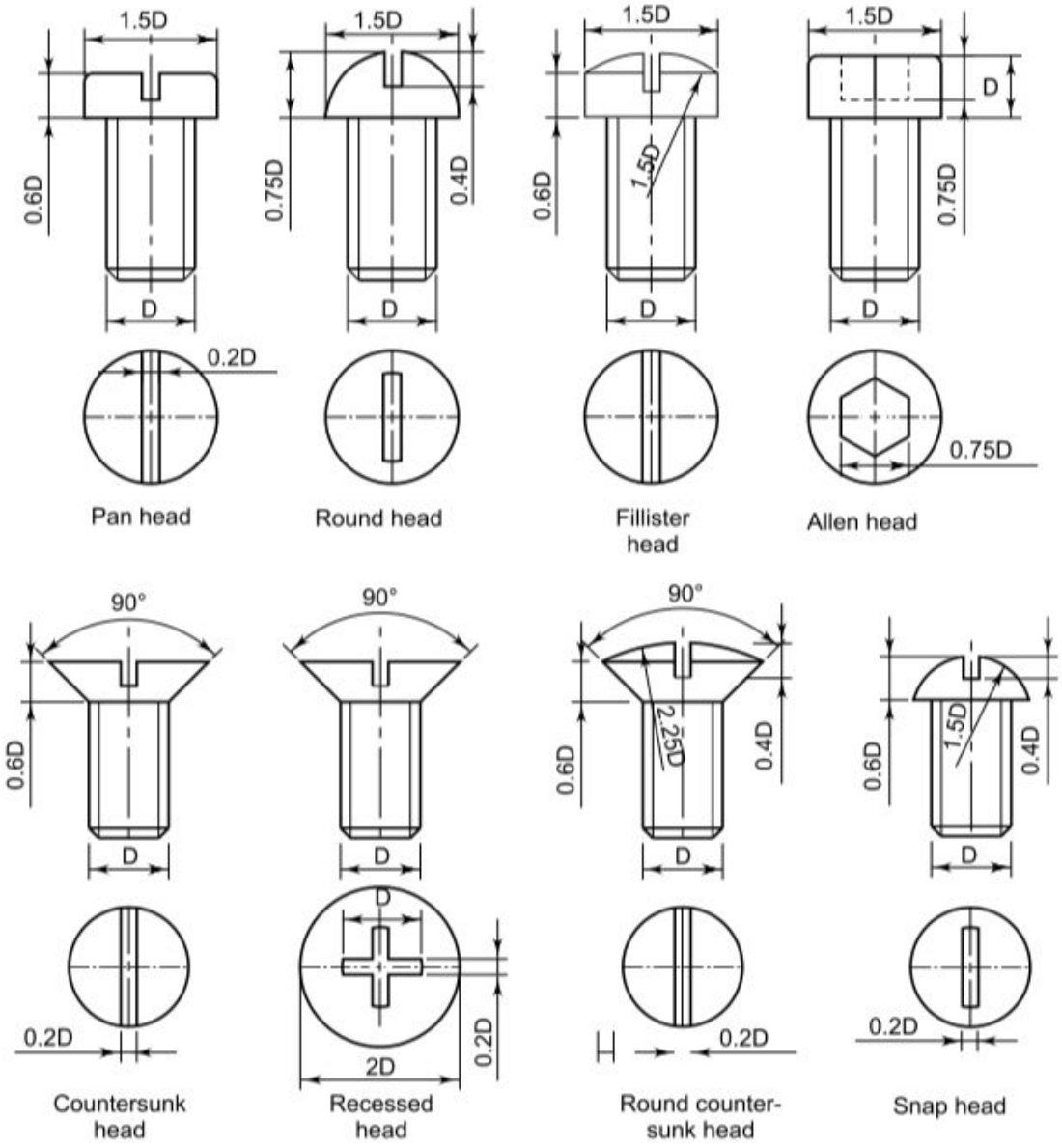
(a) Hexagonal headed bolt



(b) Square headed bolt

Fig. 5.15

Screw Heads


1.5D
0.6D
D
0.2D
Pan head
1.5D
0.75D
0.4D
D
Round head
1.5D
0.6D
1.5D
D
Fillister head
1.5D
D
0.75D
D
0.75D
Allen head
90°
0.6D
D
0.2D
Countersunk head
90°
D
D
2D
0.2D
Recessed head
90°
0.6D
2.25D
0.4D
D
0.2D
Round counter-sunk head
0.6D
1.5D
0.4D
D
0.2D
Snap head

Washers

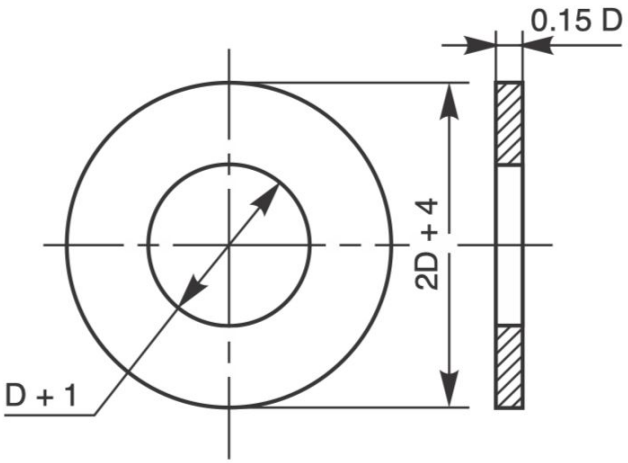


Fig. 5.16 Washer

Nut, Bolt and Washer Together

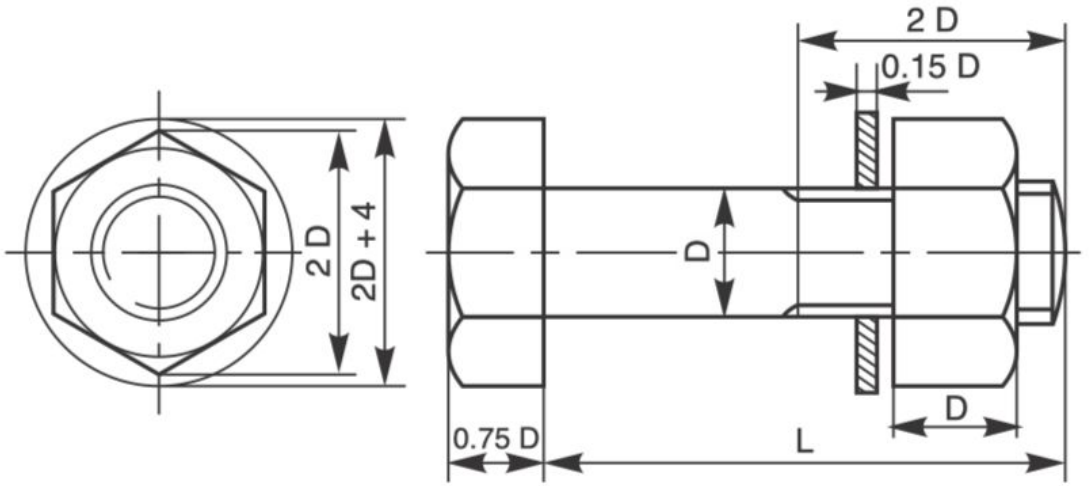


Fig. 5.17 A hexagonal headed bolt with a nut and a washer in position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योगः कर्मसु कौशलम्

Thank you !!!