CHAPTER 5

TIE-ROD AND PIPE JOINTS

5.1 INTRODUCTION

Machines use various parts which are joined in several ways for the machine to function as a whole. We have learnt about some devices like fasteners (temporary & permanent) and some simple joints to join two rods in the previous chapters. Let us now learn some more miscellaneous joints which are commonly used, viz.

(a) TIE-ROD JOINT/TURNBUCKLE

(b) FLANGE PIPE JOINT

5.2 TIE-ROD JOINT/TURNBUCKLE

In our day to day life, we may come across rods/machine parts which are subjected to push and pull and this joints need to be tightened or loosened as in the case of wires of electric poles, cables, a sailboat's standing, rigging wires or even in boxing rings.

(a) Commercial Type Turnbuckle.

In such cases, an adjustable joint known as 'turnbuckle' is used. Turnbuckle/Tie-rod Joint is an adjustable temporary joint, which connects the ends of two rods axially when they are subjected to push/pull (tensile) forces. It serves as a joining device between the ropes and the posts or rods.

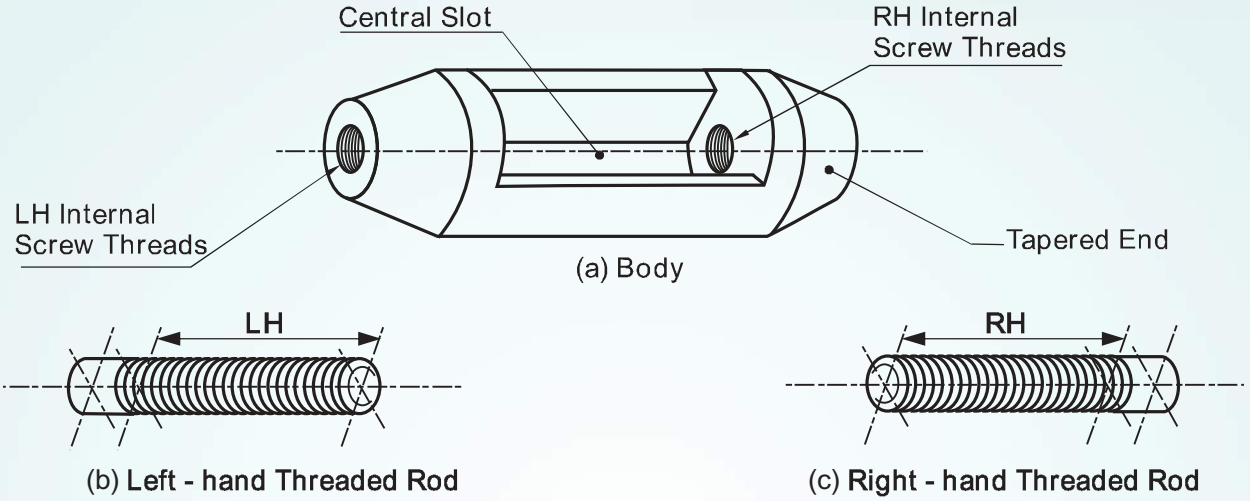
(b) In electric poles.

(c) In boxing rings

USE OF TURNBUCKLE

Fig.5.1

The 'turnbuckle' consists of an elongated metal tube (body) which is cylindrical in shape and has tapered ends. Its central portion has a slot to aid tightening and loosening of rods by tomy bar. Each tapered end of the body has threaded holes with opposite internal screw threads, i.e. right hand (RH) threads at one end and left-hand (LH) threads at the other, as shown in Fig 5.2.

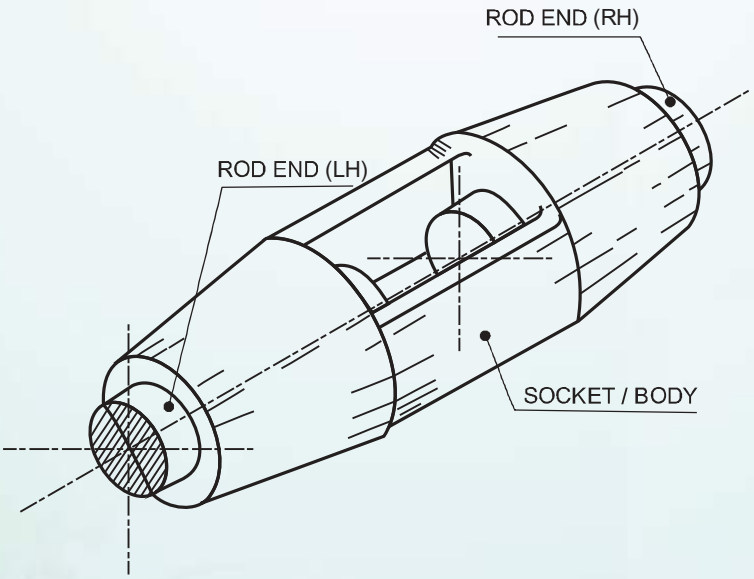


DETAILS OF A TURNBUCKLE

Fig. 5.2

(We have discussed about the right hand and left hand screw threads (RH & LH) in Chapter 2).

Even the two rods / ring bolts have threads of opposite hand, which are screwed in and out of the body simultaneously to adjust the pull/ push (tension) or length, without twisting the wires or attached cables.



ASSEMBLY OF A TURNBUCKLE (PICTORIAL VIEW)

Fig. 5.3

Now, let us understand their orthographic views, with the help of an example and move on to assembly of different parts of the `Turnbuckle' and then drawing of the required sectional views.

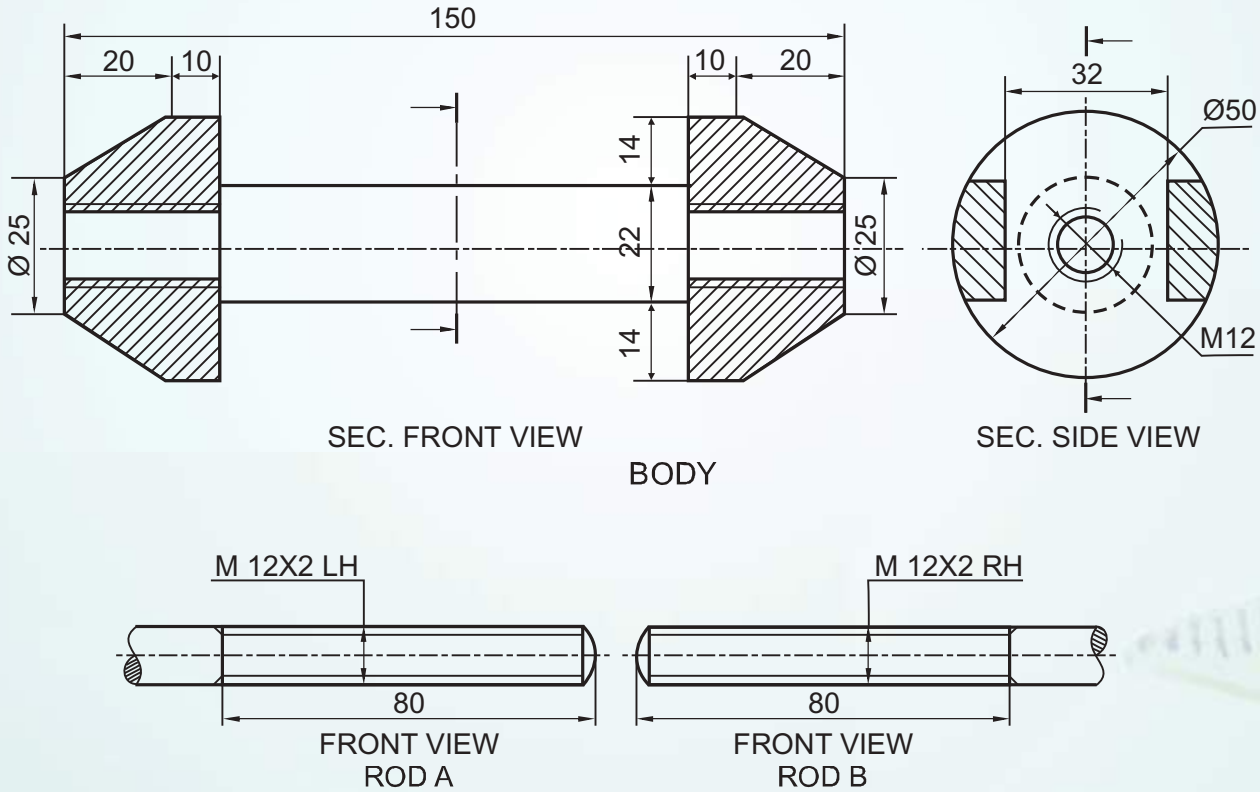
Example : The Fig 5.4 shows details of the parts of a Turnbuckle. Assemble these parts correctly and then draw its following views to scale 1:1, inserting 50mm threaded portion of each rod inside the body of Turnbuckle.

(a) Front view, upper half in section.

(b) Top view.

(c) Side view as viewed from left.

Write heading and scale used. Draw projection symbol. Give important dimensions.



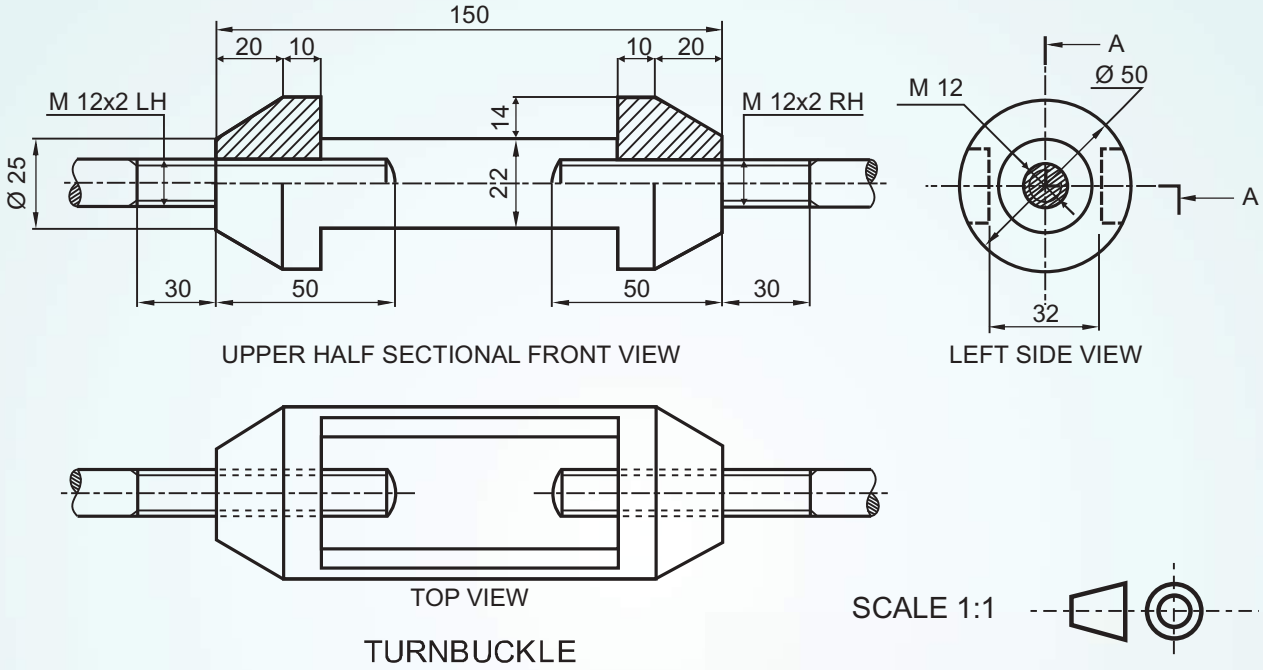
DETAILS OF A TURNBUCKLE

Fig. 5.4

Solution:

Points to remember :

(1) Only 50mm of the threaded portion of the rods will be inside the turnbuckle, the remaining 30mm portion will be shown outside the body as can be seen in the Fig. 5.5 below.



ASSEMBLY OF A TURNBUCKLE (ORTHOGRAPHIC VIEWS)

Fig. 5.5

(2) It can also be noticed that the width of the edges of the slots can be obtained from the side view.

(3) In the sectional front view, the rods need not be locally sectioned as no intricate inner details are present, as in the previous chapter.

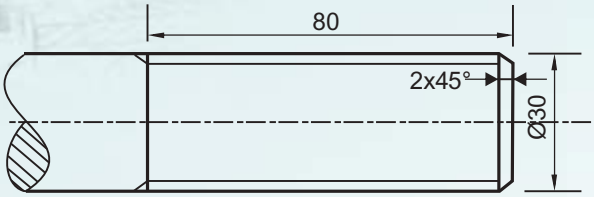
Let us consider another example, and draw the orthographic views of the assembled parts.

Example : The Fig 5.6 shows the details of the parts of a Turnbuckle. Assemble these parts correctly, and then draw its following views to scale 1:1, inserting 60mm threaded portion of each rod inside the body of the Turnbuckle.

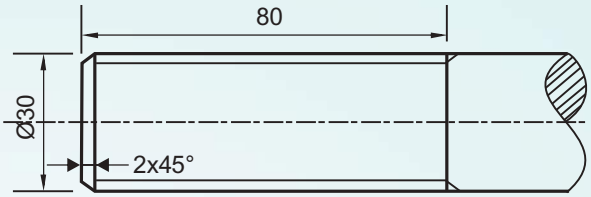
(a) Front view, lower half in section.

(b) Side- view as viewed from the right.

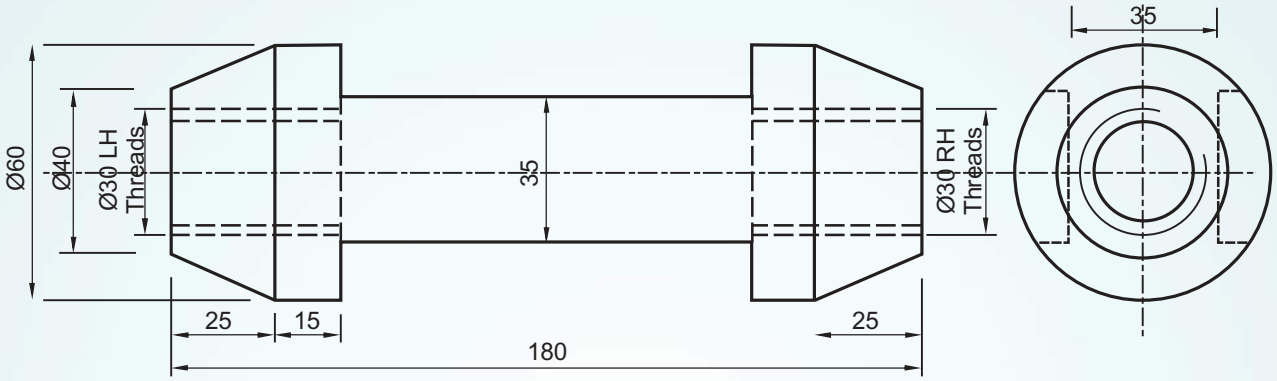
Print title and scale used. Draw projection symbol. Give six important dimensions.



ROD-A LH THREADS



ROD-B RH THREADS

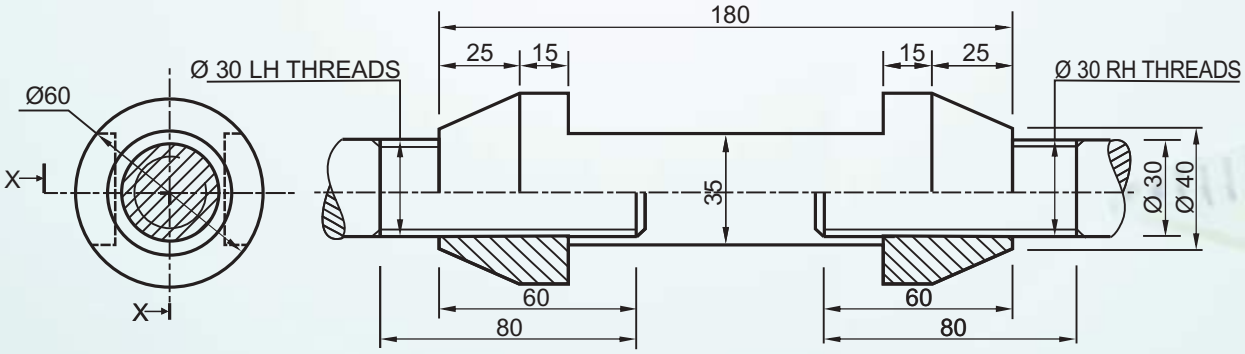


BODY

DETAILS OF A TURNBUCKLE

Fig. 5.6

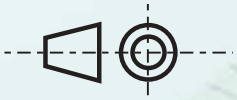
Solution:



RH SIDE VIEW

FRONT VIEW (LOWER HALF IN SECTION)

SCALE 1:1



ASSEMBLED ORTHOGRAPHIC VIEWS OF A TURNBUCKLE

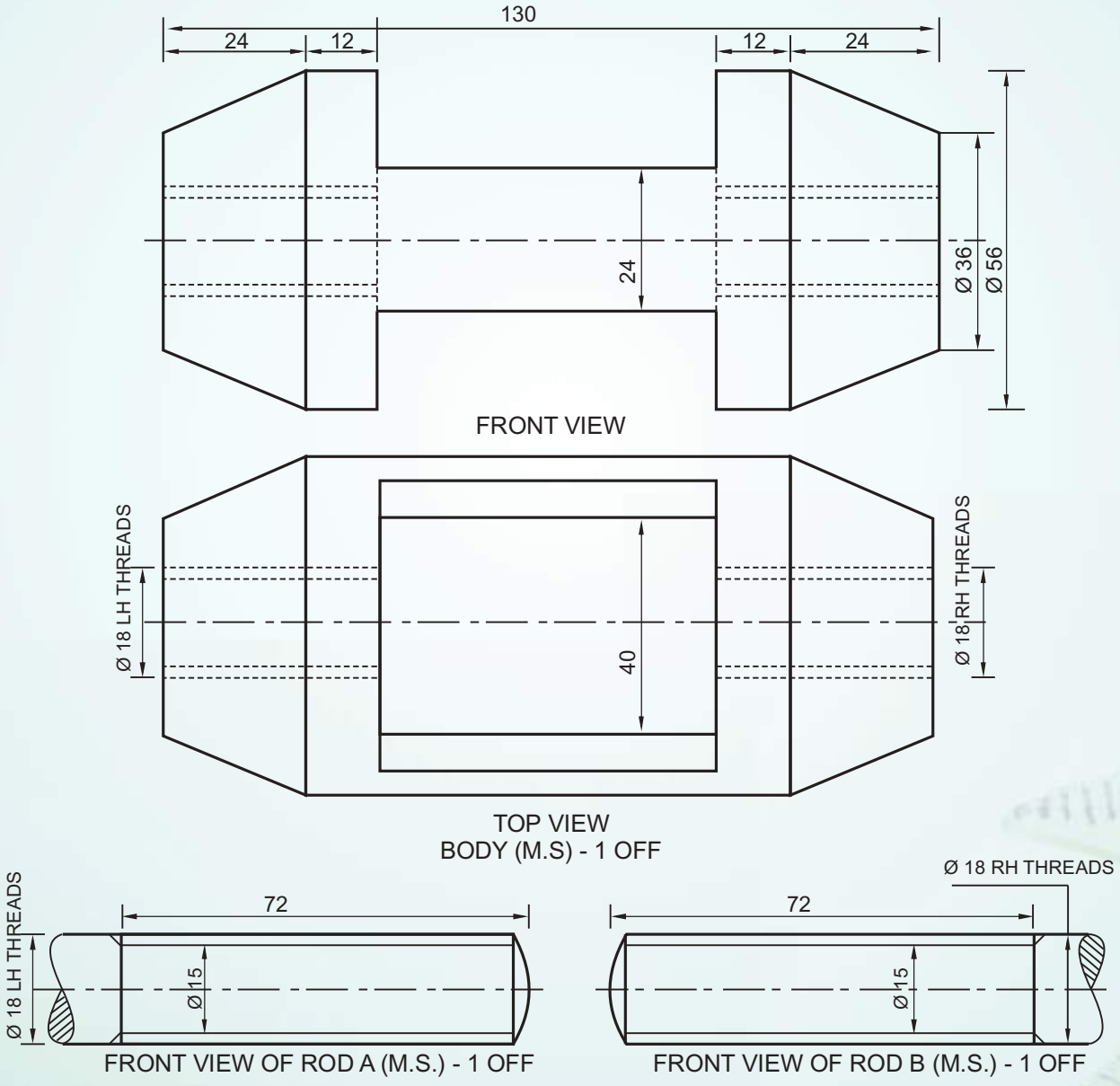
Fig. 5.7

Exercise:

The given figure shows the details of the parts of a Turnbuckle. Assemble these parts correctly and then draw the following views using scale 1:1, inserting 55 mm threaded position of each rod inside the body of the turnbuckle.

(a) Front view, upper half in section

(b) Left hand side view.



TURN BUCKLE

Fig. 5.8

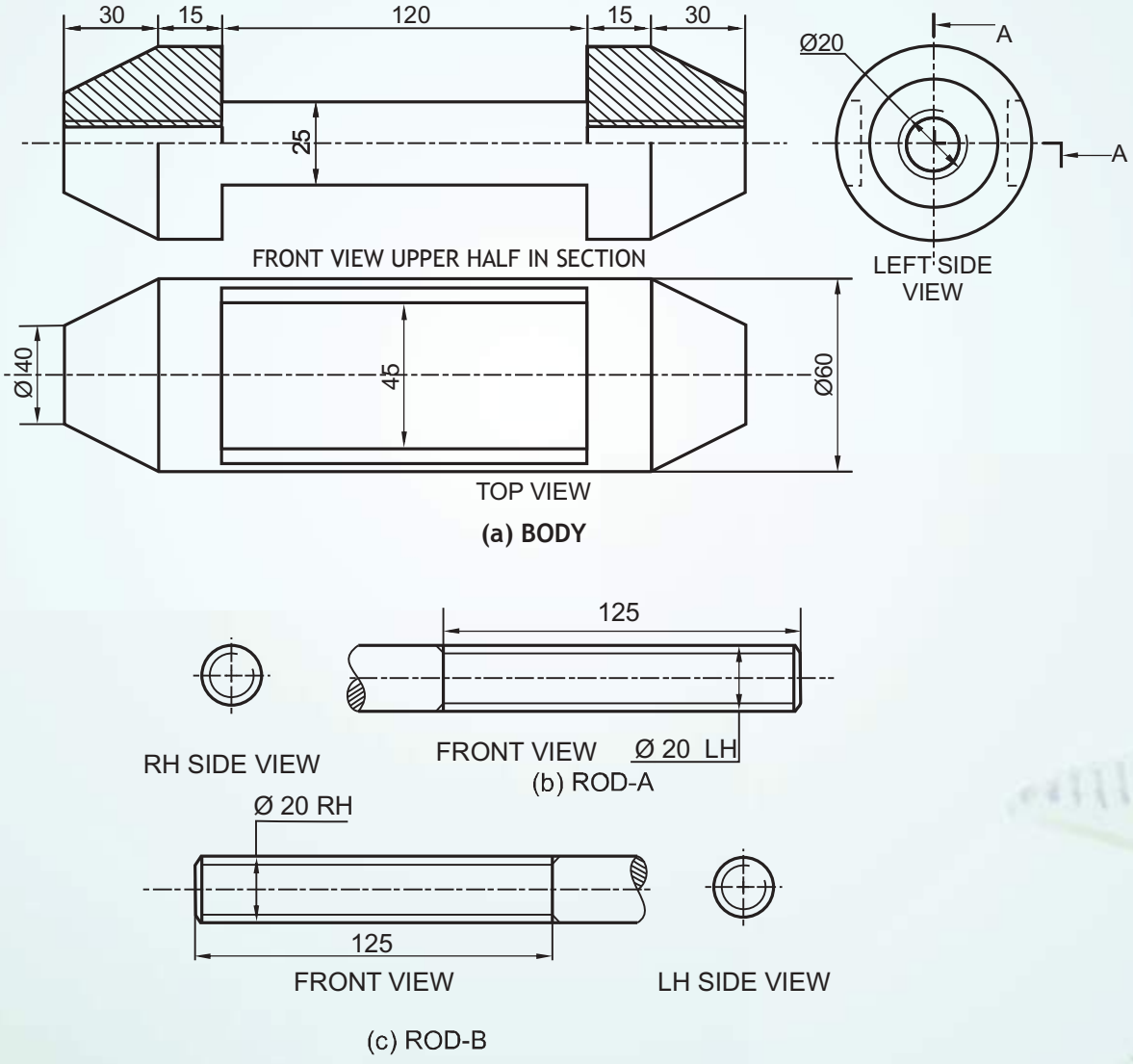
Exercise :

Figure 5.9 and shows the disassembled views of the parts of a Turn Buckle. Assemble the parts correctly, and then draw the following views to scale 1:1, inserting 50 mm threaded portion of each rod inside the body of the Turn Buckle.

(a) Lower half sectional elevation.

(b) Plan.

Print the title and scale used. Give six important dimensions.



ORTHOGRAPIC VIEWS OF DETAILS OF A TURNBUCKLE

Fig.5.9

Example:

The given figure shows the assembly of parts of a TURNBUCKLE. Dis-assemble the parts and then draw the following views of the following components to scale 1:1, keeping them in the same position with respect to H.P. and V.P.

(a) BODY

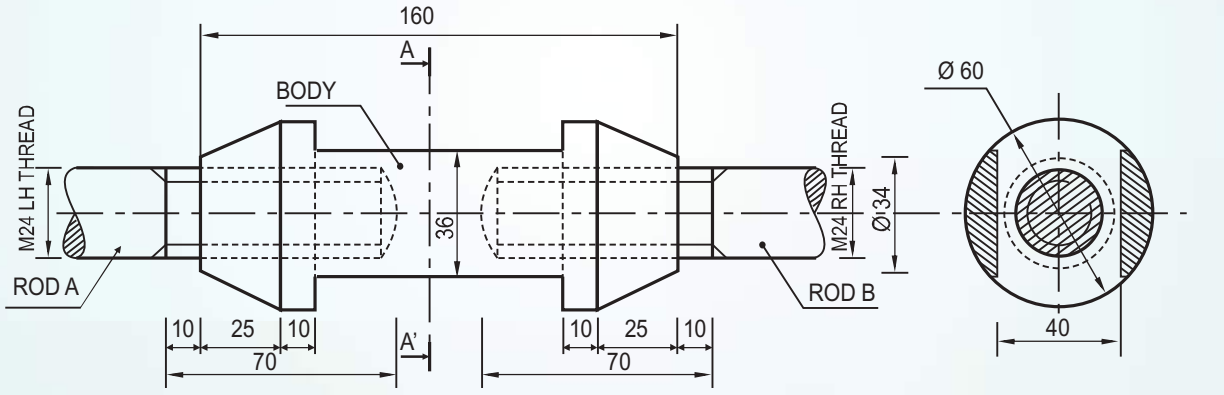
(i) Front view, lower half in section

(ii) Top view

(b) ROD-B

(i) Front view

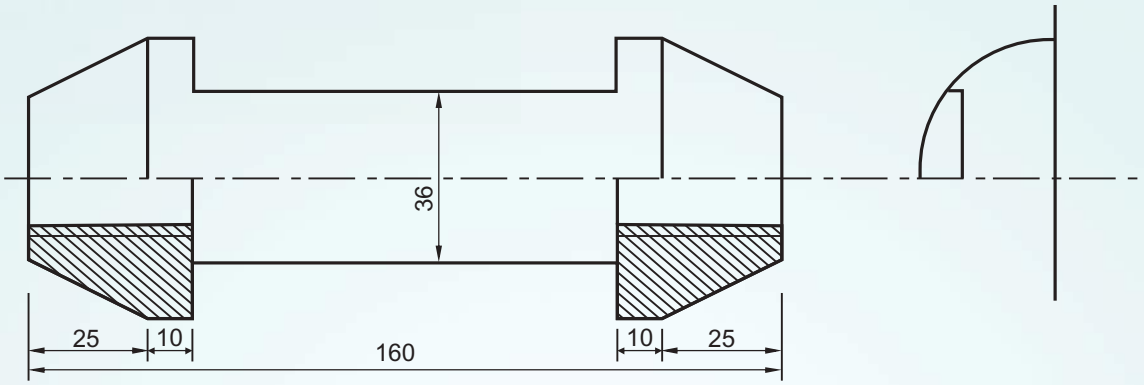
(ii) Left hand side view



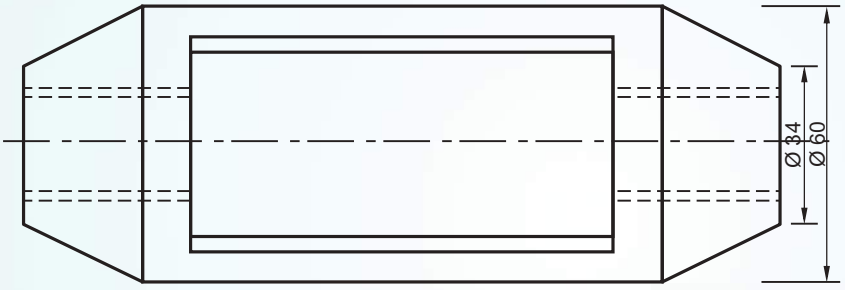
TURNBUCKLE

Fig. 5.10

Solution:

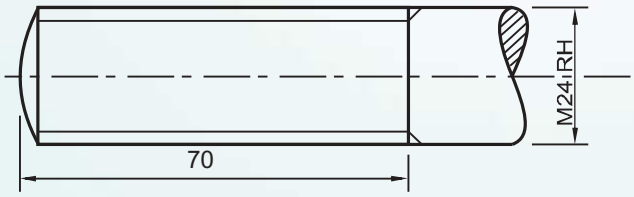


FRONT VIEW LOWER HALF IN SECTION

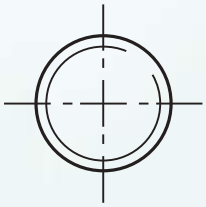


TOP VIEW

BODY



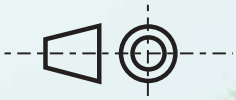
FRONT VIEW



LH SIDE VIEW

ROD-B

SCALE 1:1



TURNBUCKLE

Fig. 5.11

Exercise :

The given figure shows the assembly of a Turn Buckle. Disassemble the parts and then draw the following views, to scale 1:1, keeping the same position of the parts with respect to H.P. and V.P.

(a) BODY

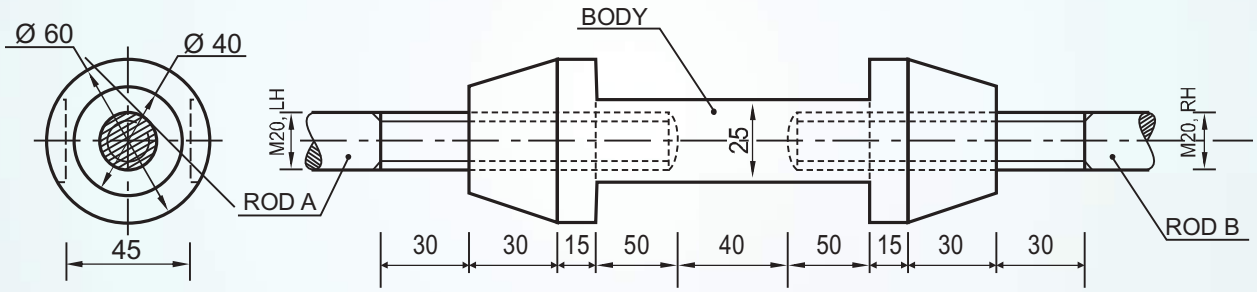
(i) Front view upper half in section

(ii) Top view

(b) ROD B

(i) Front view

(ii) Left side view



TURNBUCKLE

Fig. 5.12

5.3 PIPE-JOINTS

Those long hollow cylinders or 'pipes' are a regular feature, be it the pipes that bring water from treatment plants to your home or the drainage pipes or even the roadside long gas pipe-line.

Fig. 5.13 (a)

Fig. 5.13 (b)

Since ages, we know pipes have been extensively used as carriers of fluids like water, oil, steam gas, waste, for water supply systems, oil refineries, chemical plants, sewage piping system etc. And these pipes may be made of different materials like cast-iron, steel, wrought iron, plastic or concrete as per the requirement; but they "can't be made of a desired length" for a particular use, due to constraints of manufacturing, transportation, storing and handling difficulties. So pipes of standard length are taken and joined together, depending upon the material and purpose for which it is used.

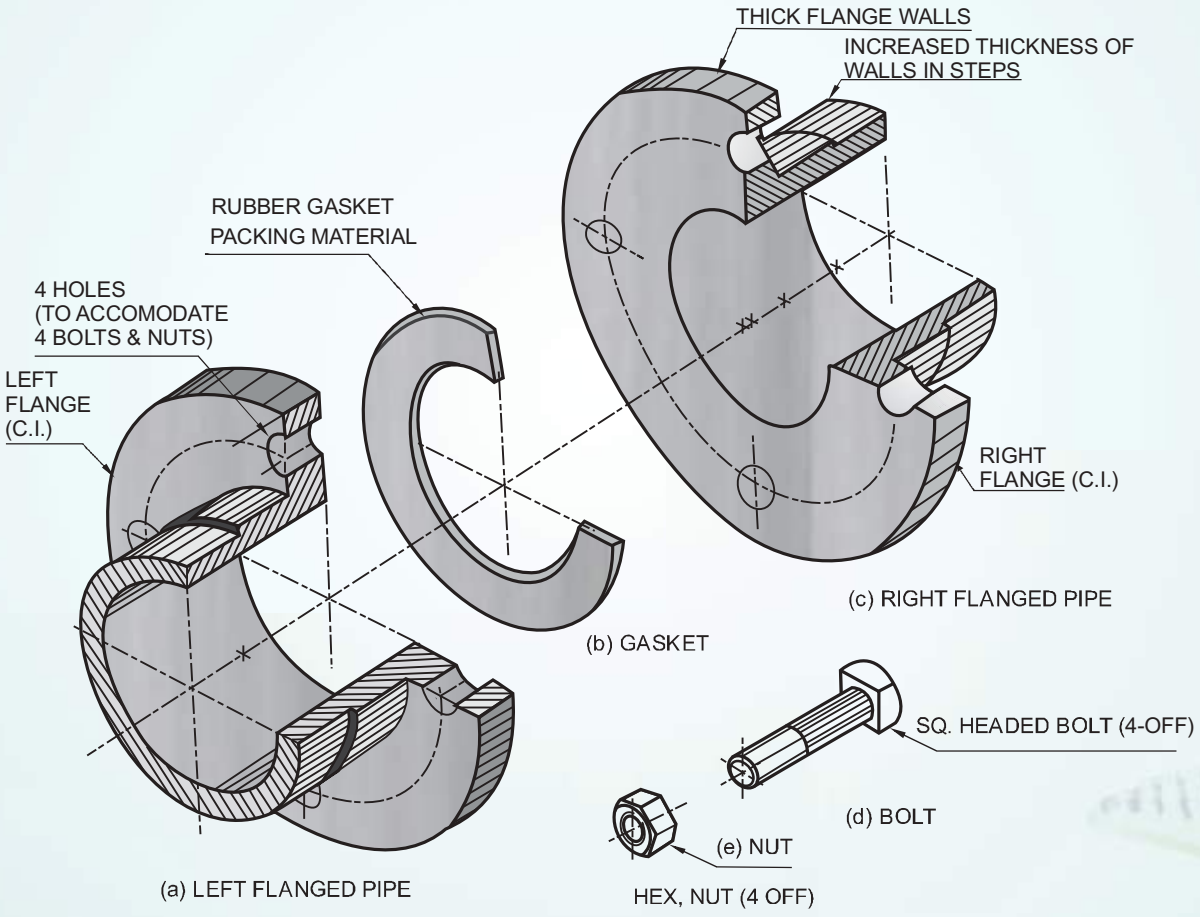
The most common among them is the 'Cast Iron Flange Pipe Joint' which we will discuss in detail.

As the name suggests, this type of joint is used for cast-iron (C.I.) pipes, which are usually of large diameter not less then 50 mm and used mostly for low-pressure applications, such as underground sewer pipes, water and gas lines and drainage in buildings. We can also see this type of joint in the water outlet pipes installed in several schools as a fire safety measure.

In this type of joint, both the hollow cylindrical pipes have a projected circular ring/ flared rim on their ends, which is known as 'flange', as shown in fig 5.14. It serves to hold the pipe in place, give it strength and also attach to another flange. The flanges are made thicker than the pipe-walls for strength. Greater strength may be required when pressure is high; so the thickness of the pipe-walls is increased for short lengths in steps, as indicated in the fig 5.14. We also know pipes carry liquids and gases and they need to be tight and leak-proof. In order to do so, a mechanism similar

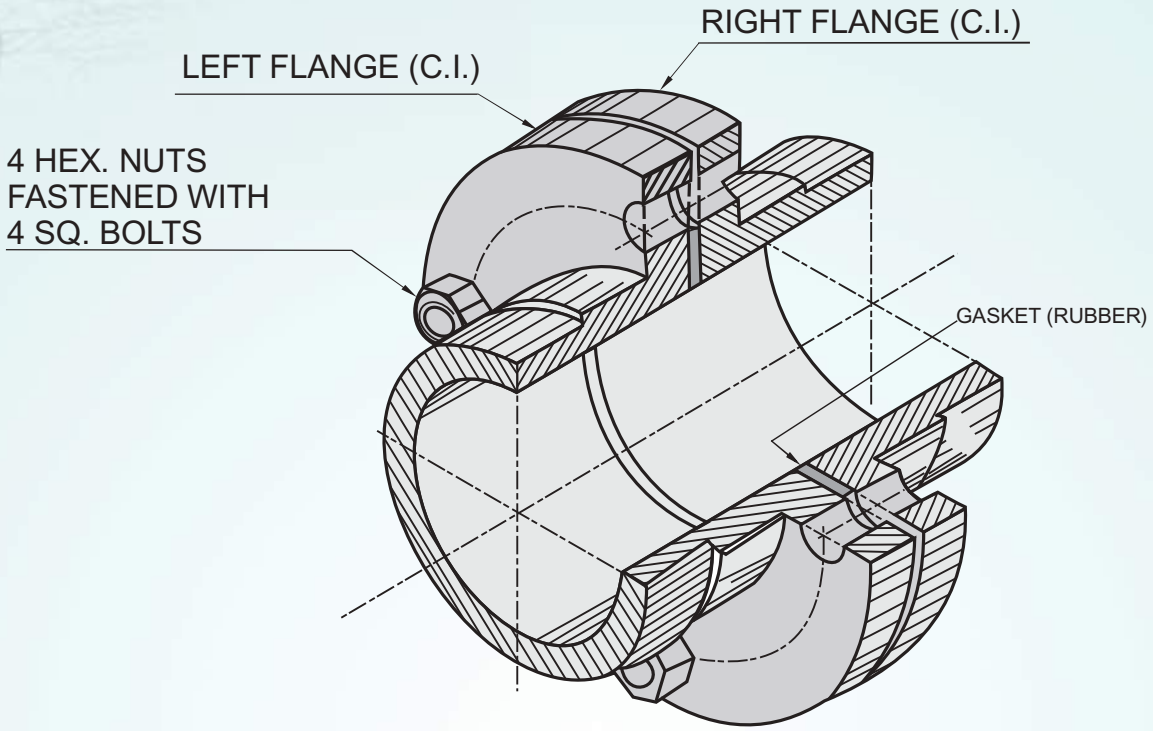
to the one, we use in pressure cookers is utilized i.e., here also we have a similar thin circular packing ring/gasket of soft material, such as Indian rubber, canvas etc. coated with red lead. This is placed in between the faces of the two flanges. For perfect alignment, these faces are machined at right angle to the axes of the pipes. Then these flanges with the gasket in between are connected together by means of nuts and bolts which are fitted through the holes in the flanges. (The bolts and nuts may be square-headed or hexagonal-headed in shape.)

Thus, it can be seen that flange joints help in easy and fast disassembly to withstand higher pressures.



DETAILS OF A FLANGE PIPE JOINT
(HALF SECTIONAL PICTORIAL VIEW)

Fig. 5.14



ASSEMBLY OF FLANGE PIPE JOINT

Fig. 5.15

Let us now understand the orthographic views of different parts of the Flange Pipe Joint and learn to assemble them correctly. And then draw the sectional view & other orthographic views of the assembly.

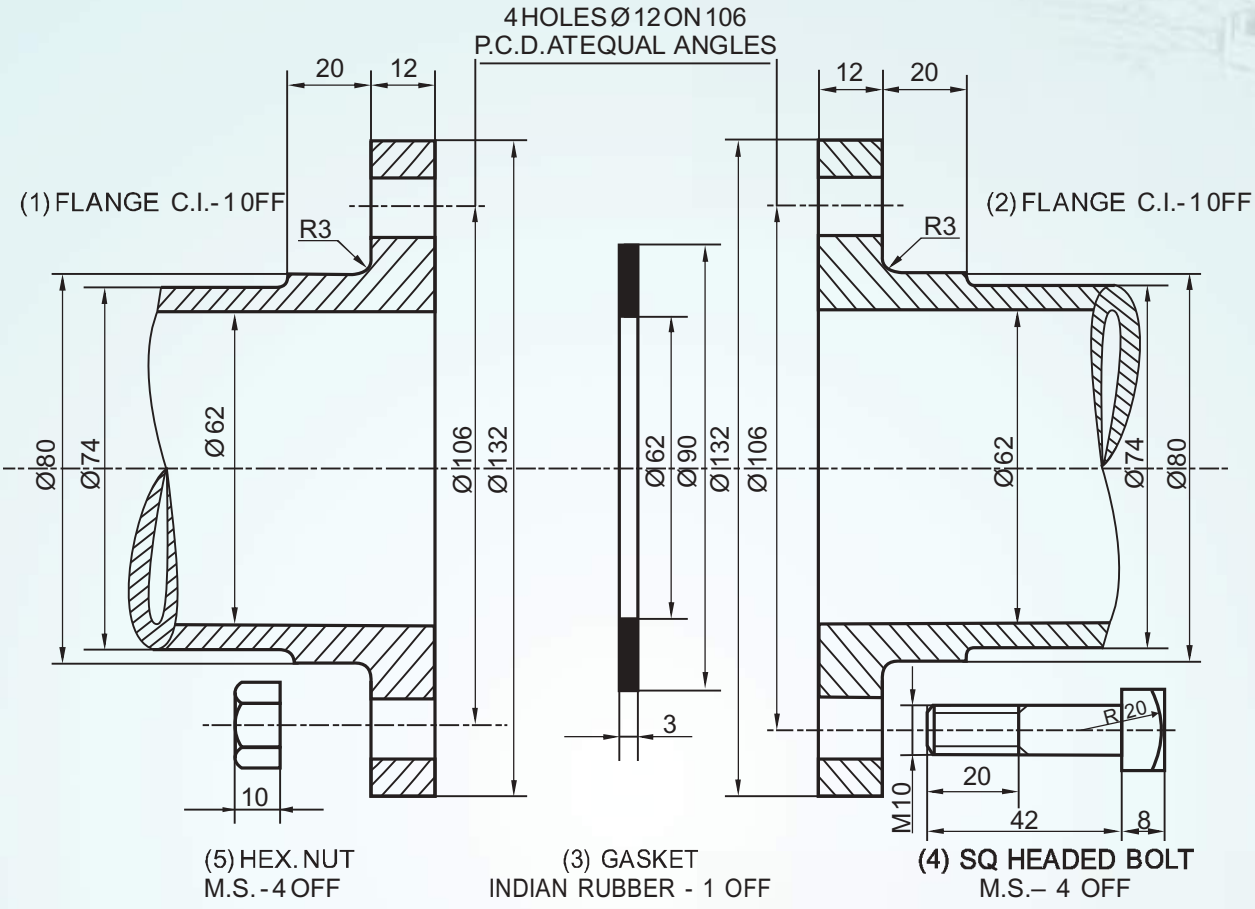
Example :

Figure 5.16 shows the details of the parts of a Flanged Pipe Joint. Assemble these parts correctly and then draw to scale 1:1, its following views:

(a) Front view, upper half in section.

(b) Side view, as viewed from left.

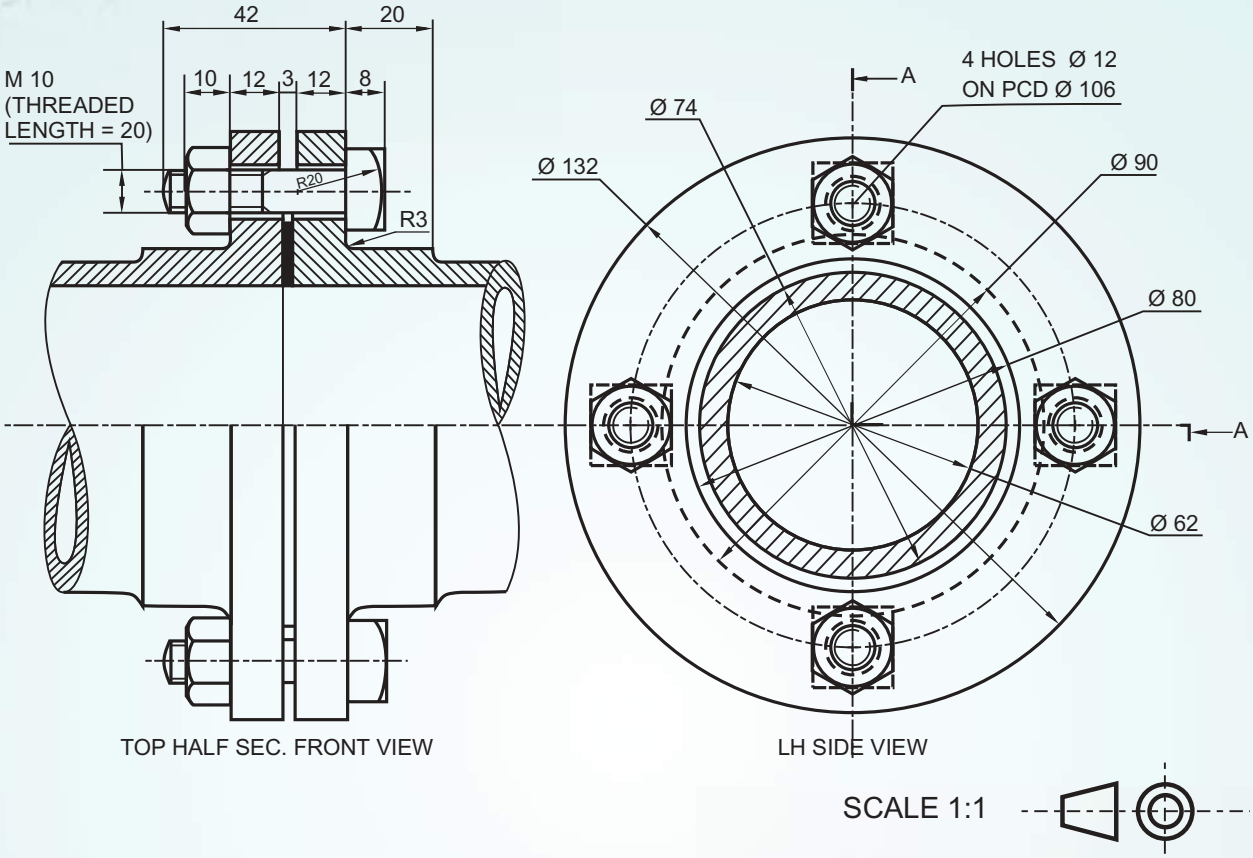
Write heading and scale used. Draw projection symbol. Give six important dimensions



DETAILS OF A FLANGE PIPE JOINT

Fig. 5.16

Solution:



ASSEMBLY OF A FLANGE PIPE JOINT

Fig. 5.17

Let us consider another example, to understand the assembled views correctly.

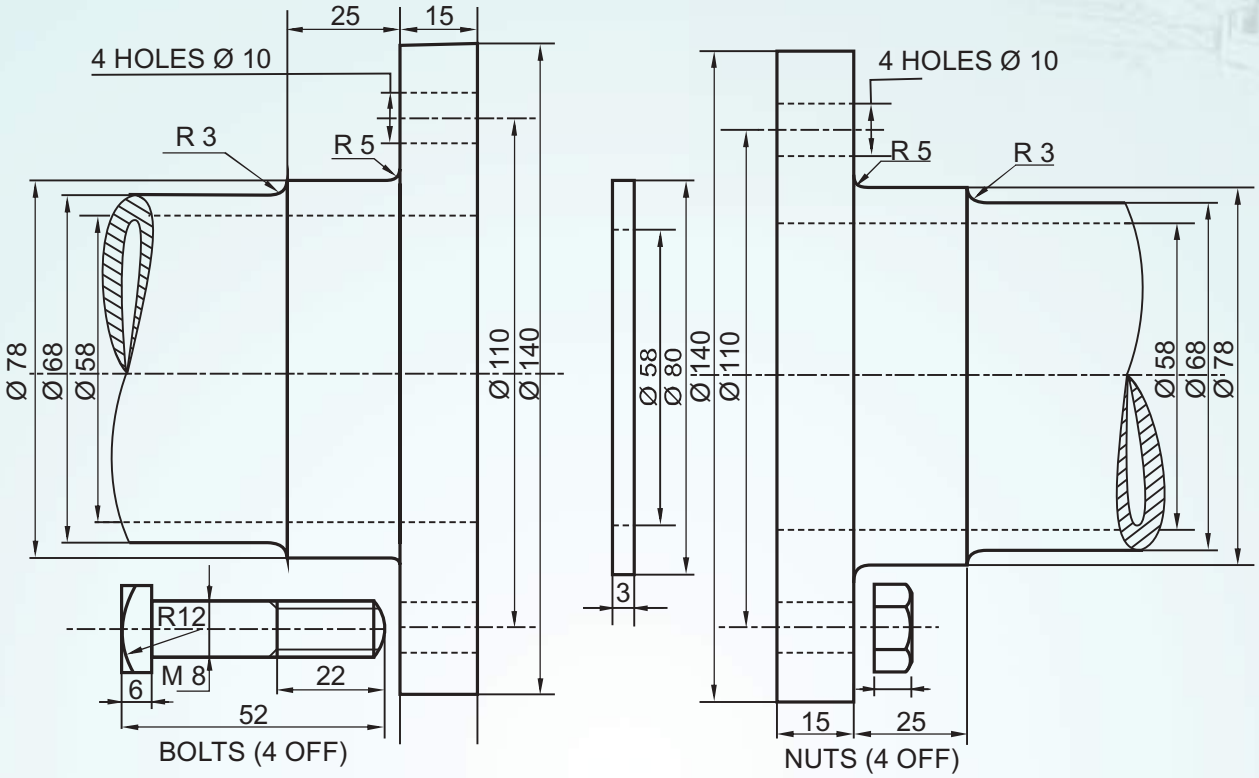
Example :

Fig 5.18 shows the details of a Flange Pipe Joint. Assemble these parts correctly, and then draw the following views to a scale full size:

(a) Front view, showing bottom half in section

(b) Side view as seen, from the right.

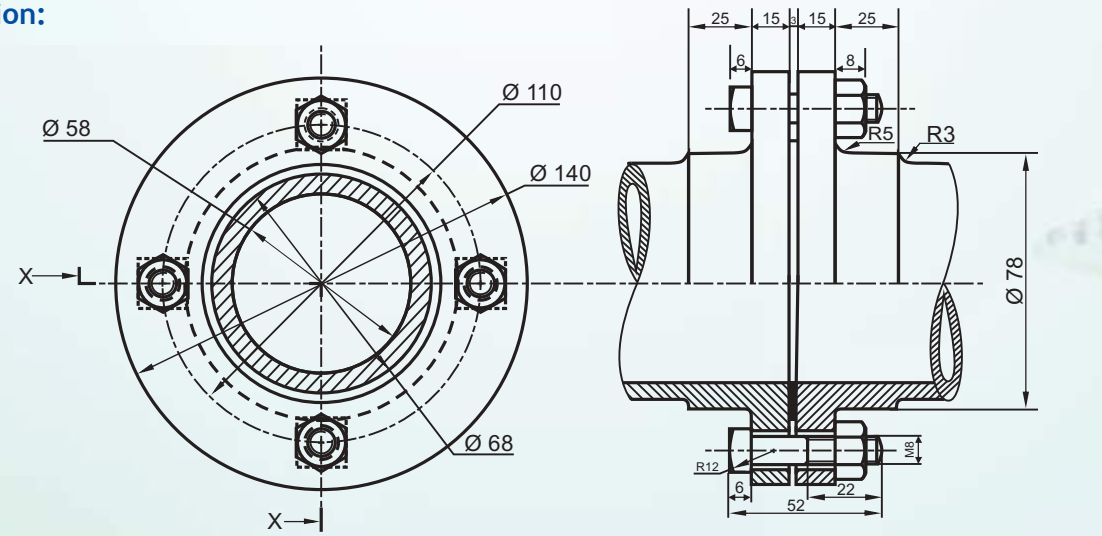
Print title and scale used. Draw the projection symbol. Give important dimensions.



DETAILS OF A FLANGE PIPE JOINT

Fig. 5.18

Solution:



ASSEMBLY OF A FLANGE PIPE JOINT

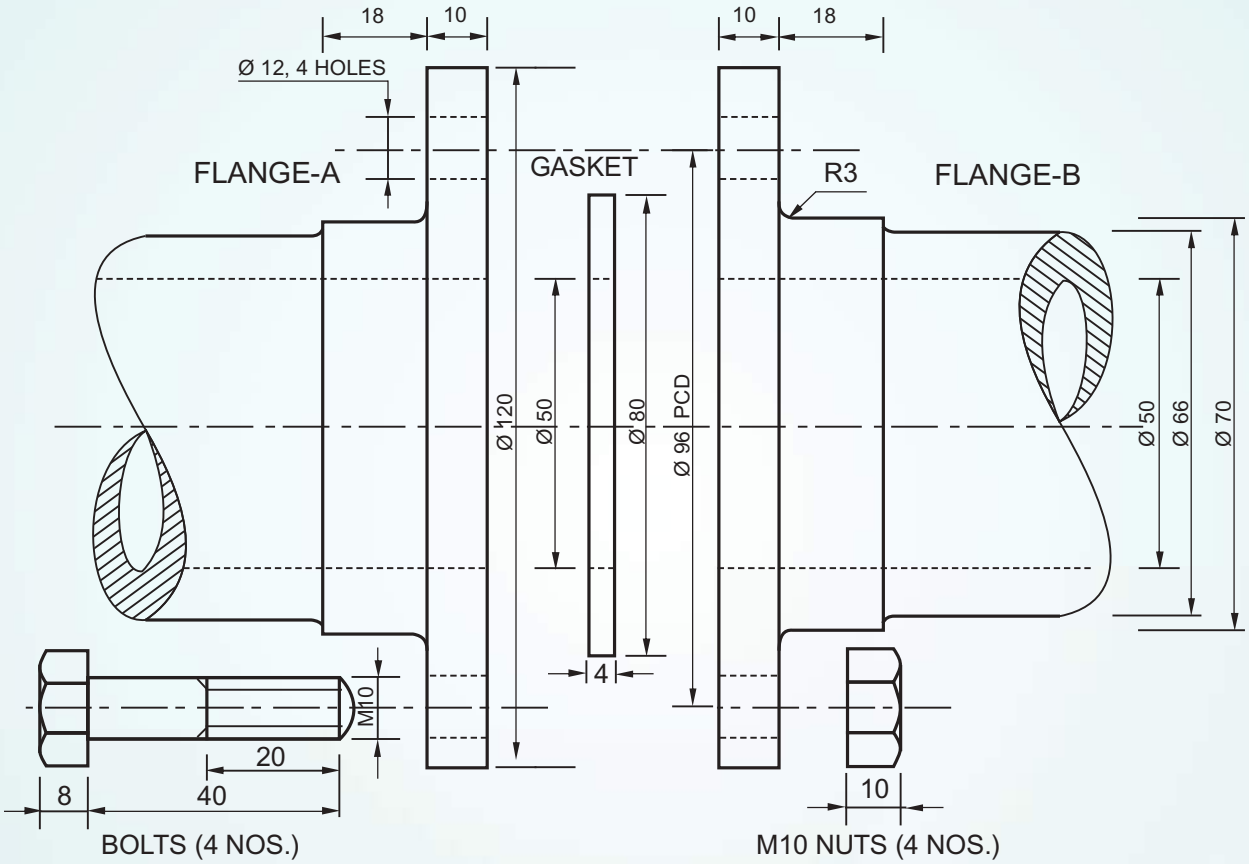
Fig. 5.19

Exercise :

The given figure shows the details of parts of Flange Pipe joint. Assemble these parts and draw to scale 1:1, the following views of the assembly.

(a) Front view lower half in section

(b) Left side view



FLANGE PIPE JOINT

Fig. 5.20

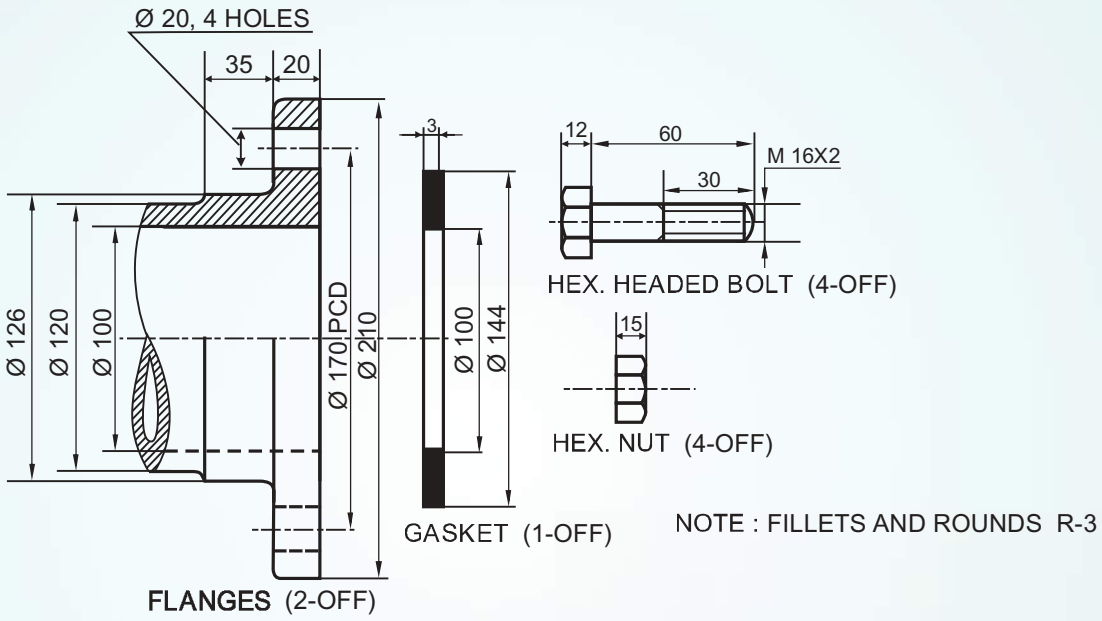
Exercise :

Figure 5.19 shows the details of parts of the Flange Pipe Joint. Assemble these parts correctly and then draw the following views to full-size scale:

(a) Upper half sectional front view

(b) Left-hand side view.

Print title and the scale used. Draw the projection symbol. Give six important dimensions.



DETAILS OF A FLANGE PIPE JOINT

Fig. 5.21

Example :

Figure shows the assembly of parts of a FLANGE PIPE JOINT. Dis-assemble the parts and then draw the following view of the following components to scale 1:1, keeping them in the same position with respect to H.P. and V.P.

(a) FLANGE B

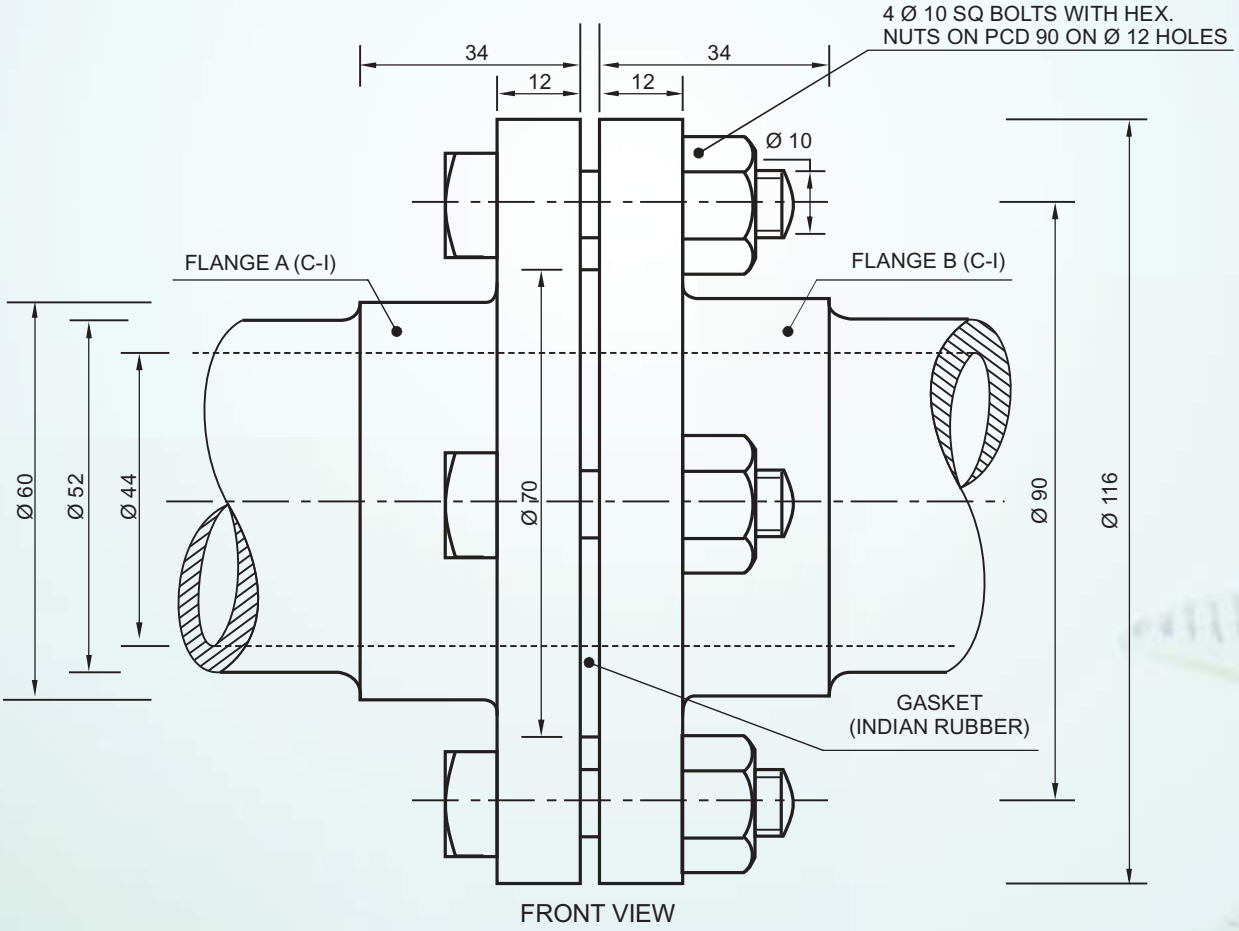
(i) Front view, upper half in section

(ii) Right hand side view

(b) GASKET

(i) Full sectional front view

(ii) Left hand side view

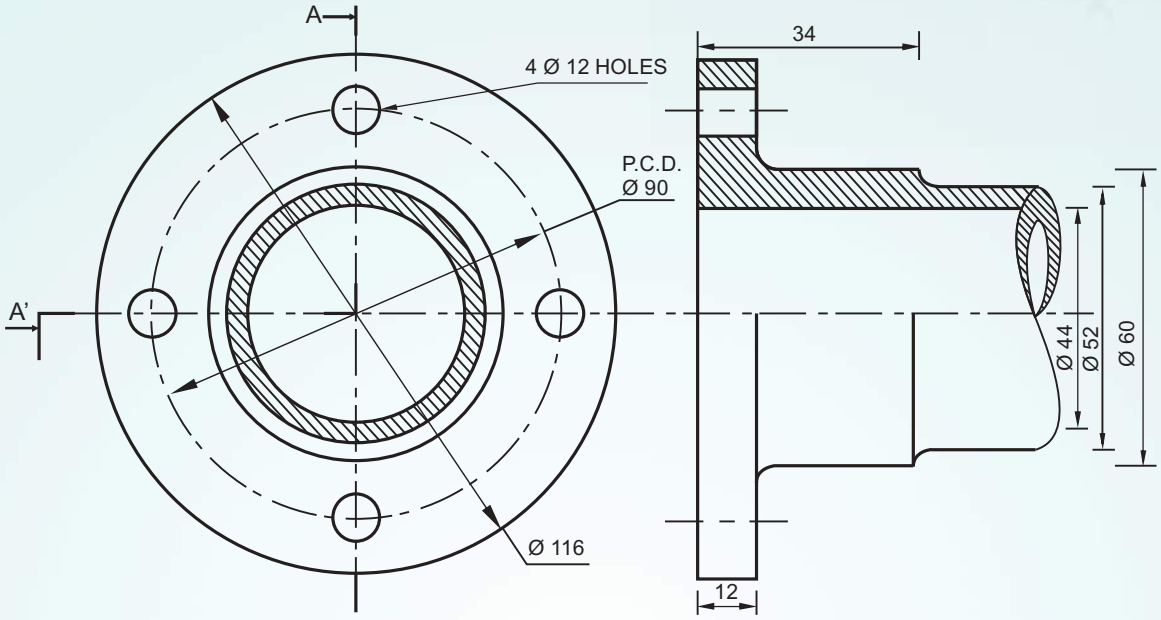


FLANGE PIPE JOINT

Take All Fillets R4

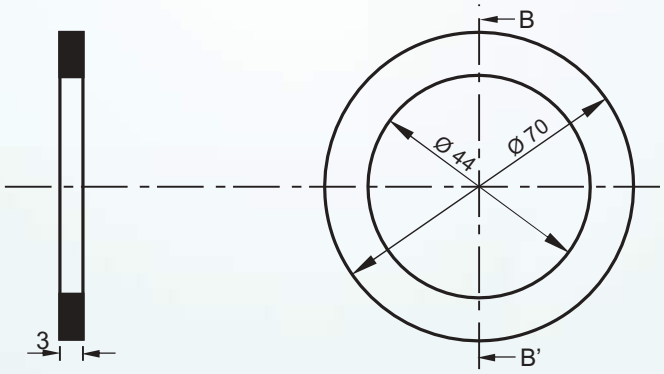
Fig. 5.22

Solution :



RIGHT HAND SIDE VIEW FRONT VIEW UPPER HALF IN SECTION

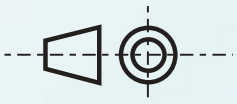
FLANGE-B



SECTIONAL FRONT VIEW L-SIDE VIEW

GASKET

SCALE 1:1



FLANGE PIPE JOINT DIS ASSEMBLY

Fig. 5.23

Exercise :

The given figure shows the assembly of a flange pipe joint. Disassemble the parts and then draw the following views to scale 1:1, keeping the same position of the parts with respect to H.P. and V.P.

(a) FLANGE A

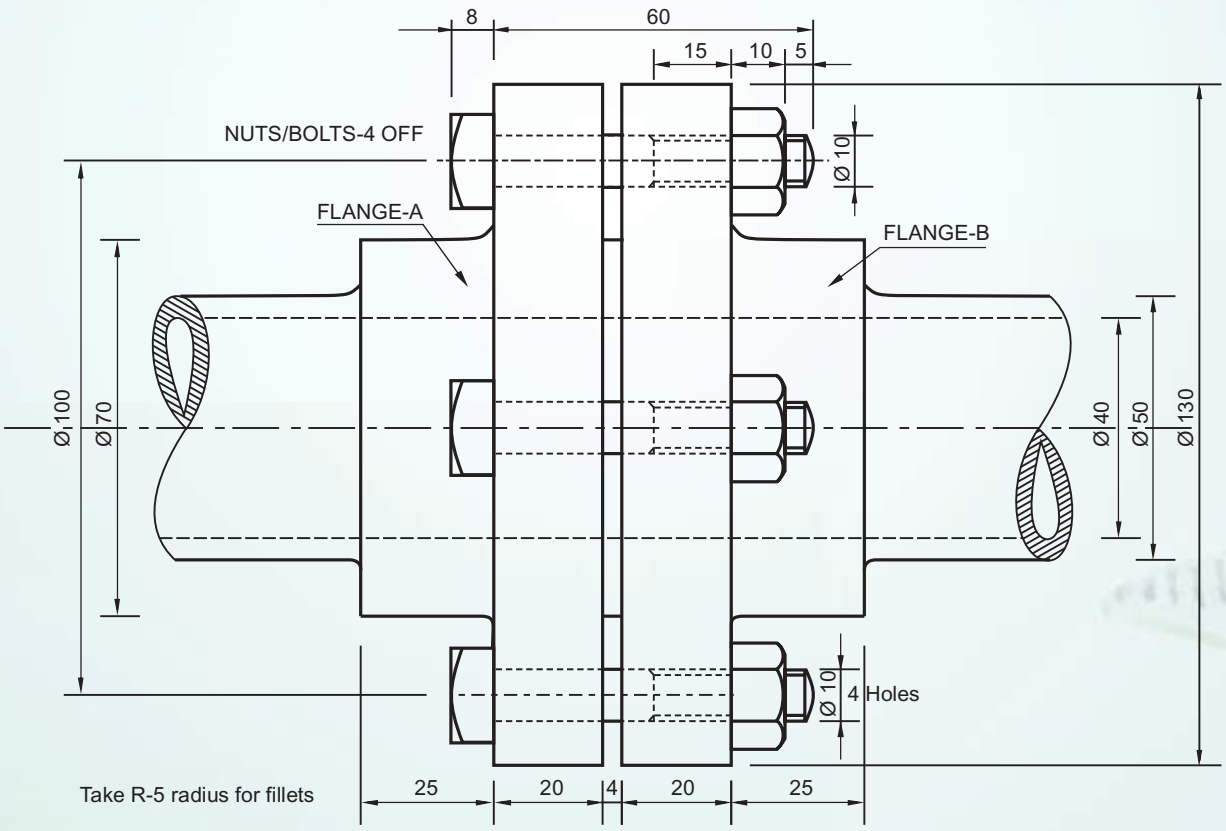
(i) Front view top half in section

(ii) Left side view

(b) HEXAGONAL NUT

(i) Front view

(ii) Right side view



FLANGE PIPE JOINT

Fig. 5.24