MECHANICAL ENGINEERING

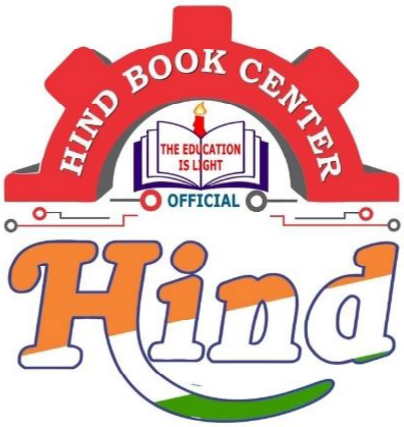
MADE EASY-2022

CLASS ROOM

Topper Handwritten Notes

04.MACHINE DESIGN

BY-PADMESH DEVEDI SIR



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Syllabus

- → Riveted Joint
- → Bolted Joint
- → Welded Joint
- → Gear (Spur)
- → Clutches
- → Brakes
- → Bearing
- → Shaft — Static Design (covered in SOM) — Bending, Twisting } TOF
  - Fatigue design — Deflection
- → Spring
- → Flywheel Design ⇒ only ESE

After 2016 — Not in GATE and ESE syllabus

- → Coupling
- → Screw Jack
- → Belt, Rope, Chain
- → Cotter / Knuckle
- → Keys

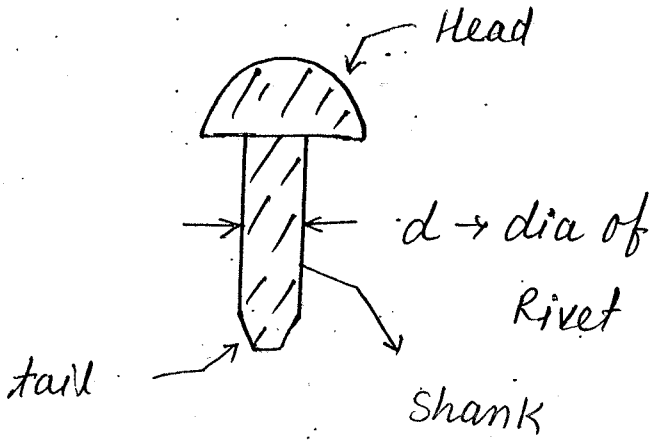
Riveted Joint

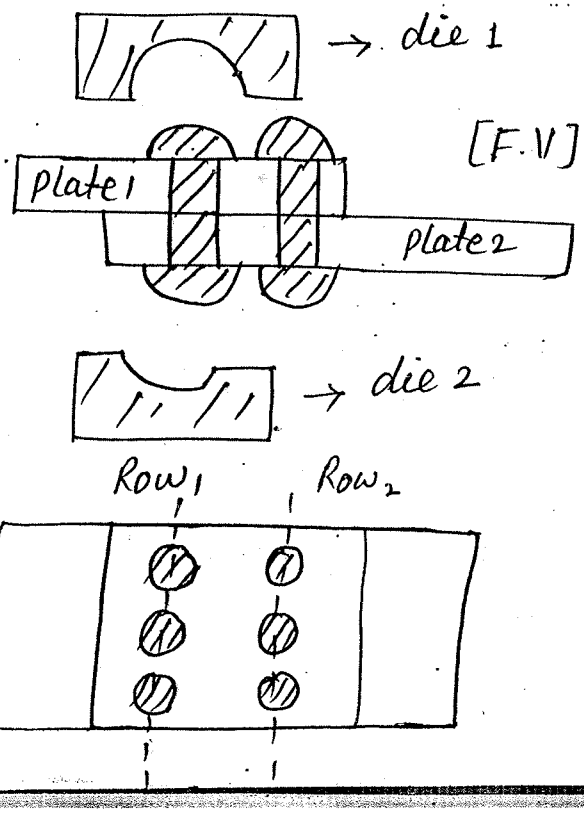
permanent Joints
- → Riveted joint
- → welded joint

Temporary Joints
- → Bolted joint
- → cottor joint / Knuckle joint
- → Keyed joint
- → Screwed joint

Riveted joint
- Lap joint
- Butt joint
  - Single strap BJ
  - Double strap BJ

Lap Joint :-





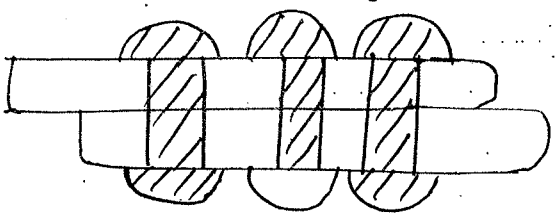
(DRLJ)

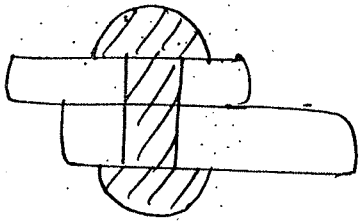
The above joint is called Double Row lap joint

Rivet Material → Aluminium, Brass, steel

Rivet manufacturing → By forging
+
Both cold and hot

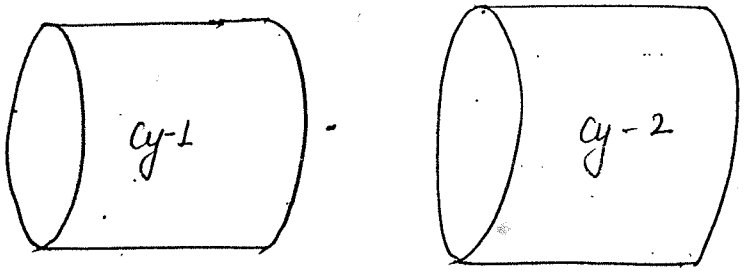
Triple Row lap joint

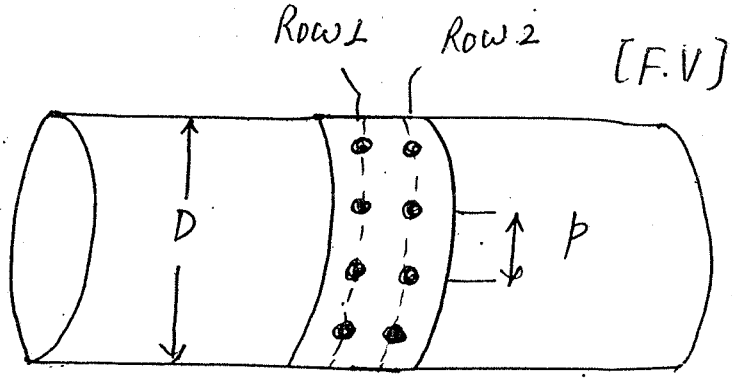




Single Row lap joint

Ex/-





[F.V]

p = pitch

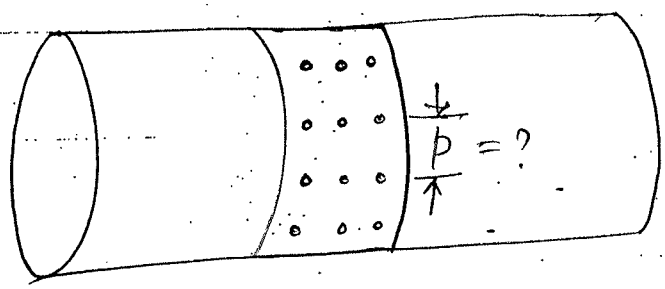
[DRLJ]

Circumferential Joint → are used to increase
↓ length of pressure vessel.
are lap joint

No. of Rivets in any Row = $\frac{\pi D}{p}$

pitch :- the distance b/w two adjacent rivets in any row is known as pitch

Ex/- [TRLJ]



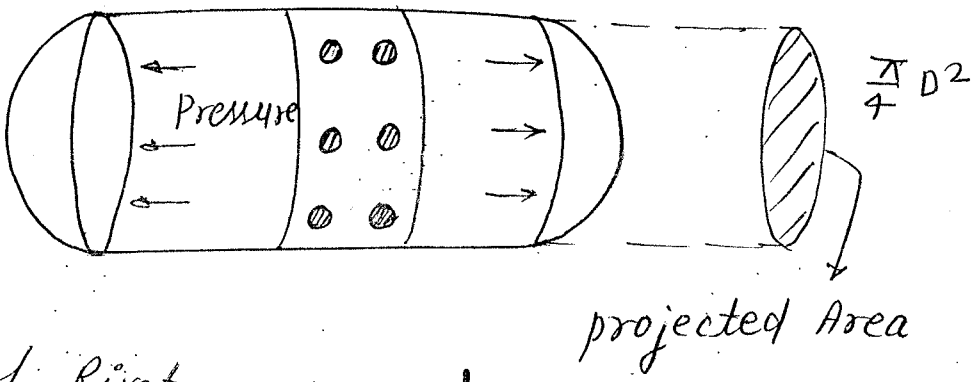
dia of PV = 1m
Total No. of rivets in joint = 60
Find the pitch = ?

$$p = \frac{\pi D}{60} = \frac{\pi \times 1000}{20} \Rightarrow p = 157\ mm$$

No. of rivets in a row = $\frac{60}{3}$

$= 20$

Ex/- D → dia of PV



n = No. of Rivets

Force = pressure x projected Area

Force = pressure x $\frac{\pi}{4} D^2$

load on each rivet = $\frac{\text{Force}}{n}$

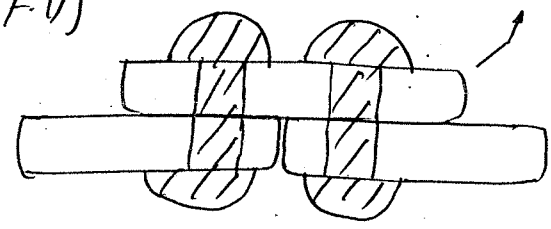
Butt Joint

Single strap BJ

Double strap BJ

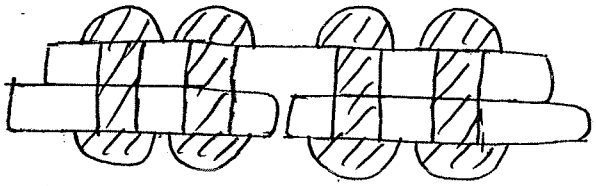
Extra plate / strap

[F.V]



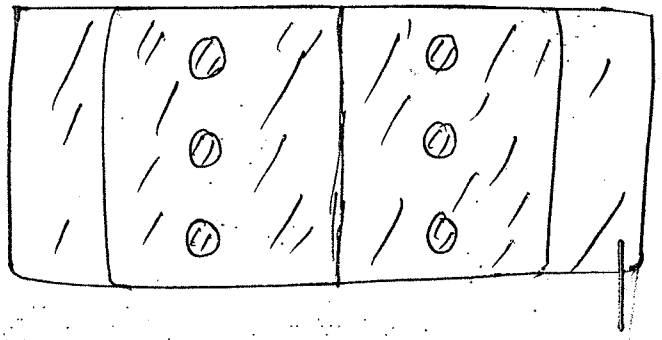
Single Row Single strap BJ

(SRSSBJ)



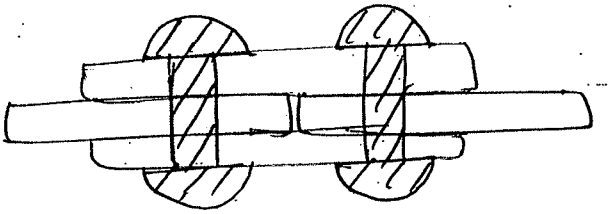
[DRSSBJ]

Note:- Always consider any one plate.



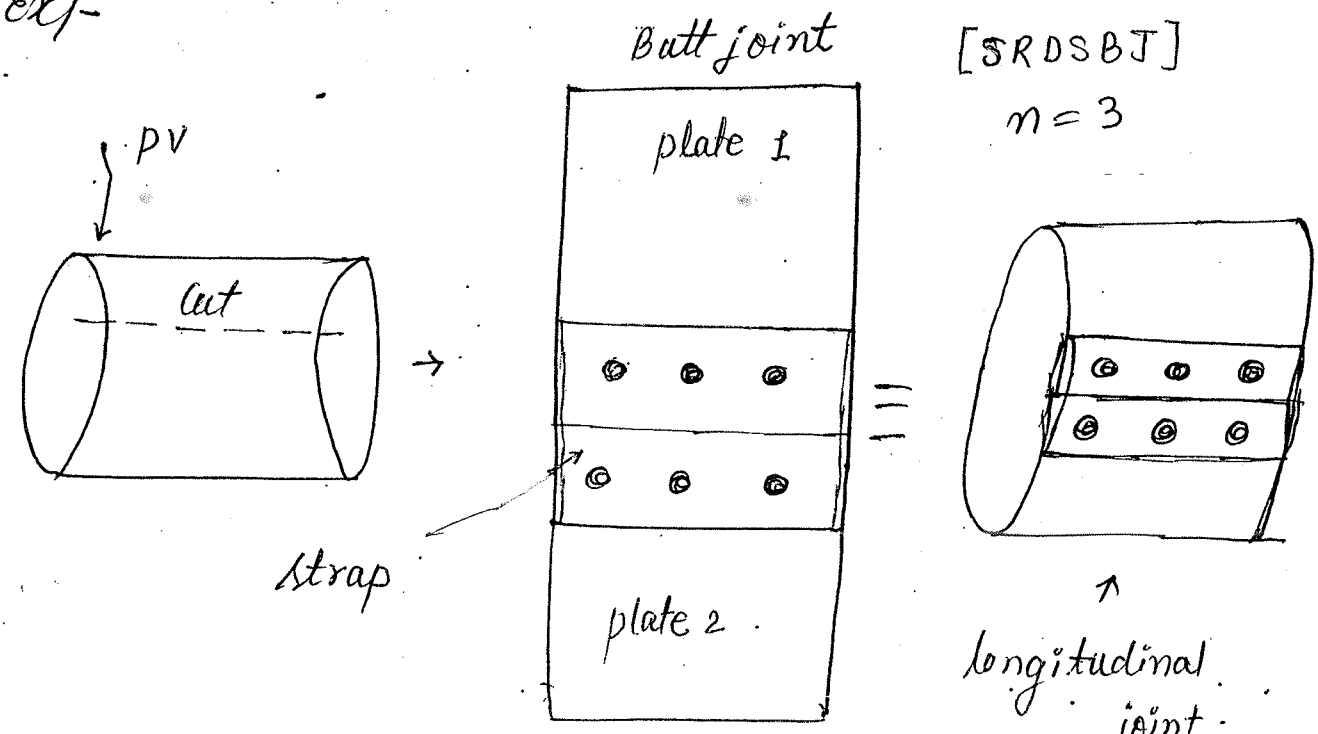
Total No. of Rivets = 3

Double strap BJ



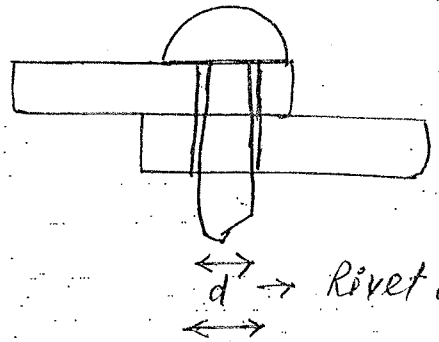
⇒ [SRDSBJ]

Ex/-



longitudinal joint → are used to increase diameter.
→ longitudinal joints are butt joints.

Rivet joint → Rivet + plate



t ⇒ plate thickness

$d_h - d = c$

diametrical clearance

Note:- For the rivet calculation shank dia d will be taken into calculation and for the plate calculation hole dia d_h will be taken into consideration.

Disadvantage over weld

→ weld strength is more
→ Complicated shape can not be jointed by rivet
→ leakage in riveted joint

Advantage over weld

→ less skilled worker required.
→ Economical joint