DESIGN STEPS FOR COUPLING

1. FIND SHAFT DIAMETER (d):-

$$M_t = \frac{KW \times 10^6 \times 60}{2\pi N} \ (N.mm)$$

$$M_t = \frac{\pi}{16} \times d^3 \times [\tau]_{SHAFT}$$

2. KEY DIMENSION (L,W,t):-

- L = 1.57d
- W = d/4
- t = d/6

CHECKING

$$M_t = L \times \frac{t}{2} \times [\sigma_{cr}]_{key} \times \frac{d}{2}$$ (Crushing Failure)

$$M_t = W \times L \times [\tau]_{key} \times \frac{d}{2}$$ (Shear Failure)

3. COUPLING DIMENSIONS :-

- Hub diameter D = 2d
- Thickness of flange t_1 = 0.4d to 0.5d
- Length of Hub or Muff L = 3.5d

CHECKING

$$M_t = \frac{\pi}{16} \left[\frac{D^4 - d^4}{D}\right] \times [\tau]_{hub}$$

If, $\tau_{hub} \le [\tau_{hub}]$ then design is safe

4. BOLT DIMENSIONS :-

- Pitch circle diameter $D_1 = D_p$ = 3d
- No. of Bolt n = 0.02d + 3
- Bolt diameter d_b

$$[M_t] = \frac{\pi}{4} \times d_b^{\,2} \times [\tau]_{bolt} \times n \times \frac{D_P}{2}$$

$$\therefore d_b = \left[\frac{8 \times [M_t]}{\pi \times [\tau]_{bolt} \times n \times D_P}\right]$$

CHECKING

For, crushing failure

$$[M_t] = n \times d_P \times \sigma_{cr} \times \frac{D_P}{2} \times t_1$$

$$\sigma_{cr\ bolt} \le [\sigma_{crbolt}]$$