



# ROHINI

**COLLEGE OF ENGINEERING AND TECHNOLOGY**

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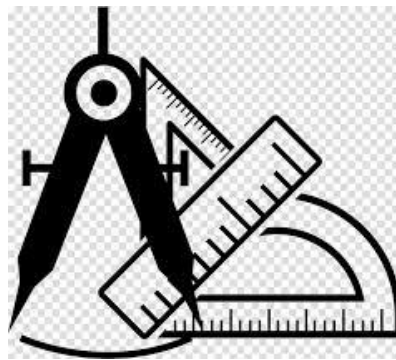
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**DEPARTMENT OF MECHANICAL ENGINEERING**

**24ME403 - METROLOGY & MEASUREMENTS**

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24ME403 - METROLOGY & MEASUREMENTS

3) Write short notes on fits. Also explain the types of fits.

### Fits:

\* A 'fit' is the dimensional difference between two mating parts, or the amount of clearance between them.

### Types of Fits:

\* The degree of tightness or looseness between the mating parts is known as 'fit'.  
\* The nature of fit is characterized by the presence and size of clearance or interference.

\* There are three types of fits as follows:

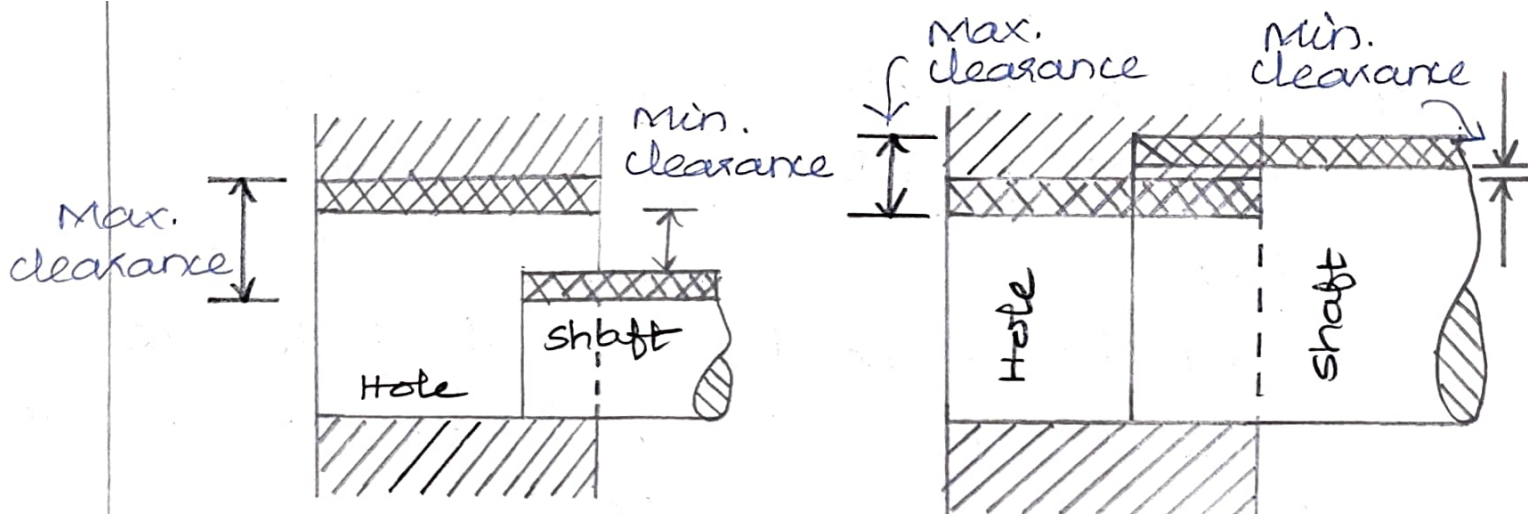
- (a) clearance fit,
- (b) interference fit, and
- (c) transition fit

### (a) clearance fits:

\* In clearance fits, the shaft is always smaller than the hole.

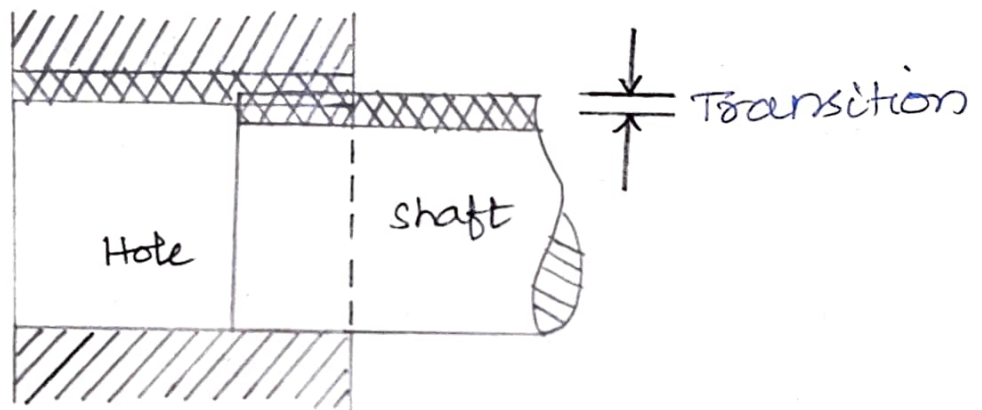
\* A positive allowance exists between the largest possible shaft and the lowest possible hole, i.e., at the maximum material condition.

\* In this type of fit, the tolerance zone of the shaft is always below the hole.



(a) clearance fit

(b) Interference fit.



(c) Transition fit

### Types of clearance fits:

#### (i) slide fit:

- \* slide fit has too small clearance.
- \* This type of fit is used when the mating parts move slowly.

\* Example: tailstock spindle in lathe, feed movement of spindle quill in drilling machine.

#### (ii) Easy slide fit:

- \* Easy slide fit has slightly more clearance than the slide fit.

\* Example: lathe spindles, piston slide valves.

### (iii) Running fit:

\* Running fit has still more clearance and is used for rotations at moderate speed.

\* Examples: crankshaft in main bearings, shaft and couplings.

### (iv) Slack running fit:

\* A slack running fit has a considerable clearance which may be required as compensation for mounting errors.

\* Examples: camshaft of IC engines, shafts in cylindrical grinding machine.

### (v) Loose running fit:

\* This type has the largest clearance, and it can be employed for very high speeds of rotation.

\* Examples: plummer blocks, idle pulleys on shafts.

### (b) Interference fits:

\* In interference fits, the shaft is always larger than the hole.

\* The tolerance zone of the shaft is entirely above that of the hole.

Types of interference fits are as follows:

#### (i) Shrink fit:

\* This fit is used to create tight joint between two parts by causing one to expand or contract relative to the other.

(ii) Heavy drive fit:

\* This type of fit is used for heavier steel parts.

(iii) Light drive fit:

\* This fit is a medium interference joint that requires force and cold or hot pressing to assemble.

⊗ Interference fits are used for making fixed permanent joints.

⊗ Examples: Steel tyres on railway car wheels, cylinder liners in cylinder blocks.

(c) Transition fits:

\* Transition fits are midway between the clearance and interference fits.

\* Main use of these fits is to ensure a proper location of mating parts which are often disassembled.

Types of transition fits are as follows:

(i) Force fit:

\* This fit is used for the parts which are rarely disassembled.

\* Example: Gears on the shafts of concrete mixture, forging machine, etc.,

(ii) Tight fit:

\* This fit provides less tightness than the force fit.

\* Examples: stepped pulleys on the drive shafts of conveyor, cylindrical grinding machine.

(iii) Wringing fit:

\* This fit gives still less tightness.

\* Examples: gears of machine tools.

(iv) Push fit:

\* This fit gives the highest clearance among all the four types of fits.

\* Examples: change gears, slip bushings, etc.,