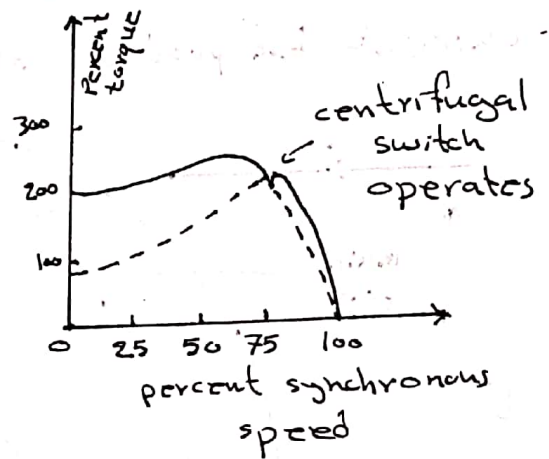
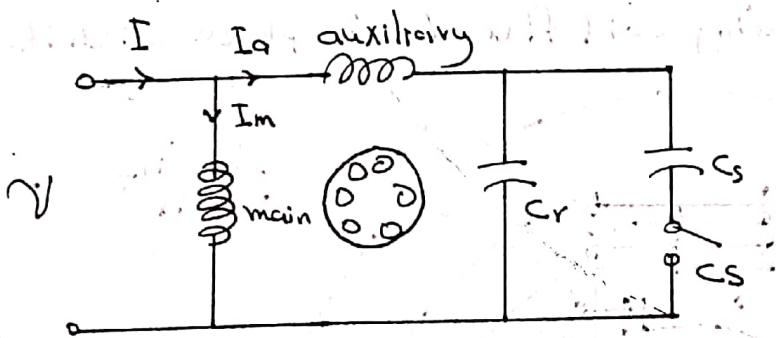


Single phase motors

C_r can be so designed as to result in a balanced 2-phase motor under running conditions. In this way torque pulsations are reduced and quite motor is obtained. Power factor and efficiency are also improved. The starting capacitor C_s is of the ac electrolytic type, but permanent capacitor C_r should be ac paper, foil and oil type capacitor.



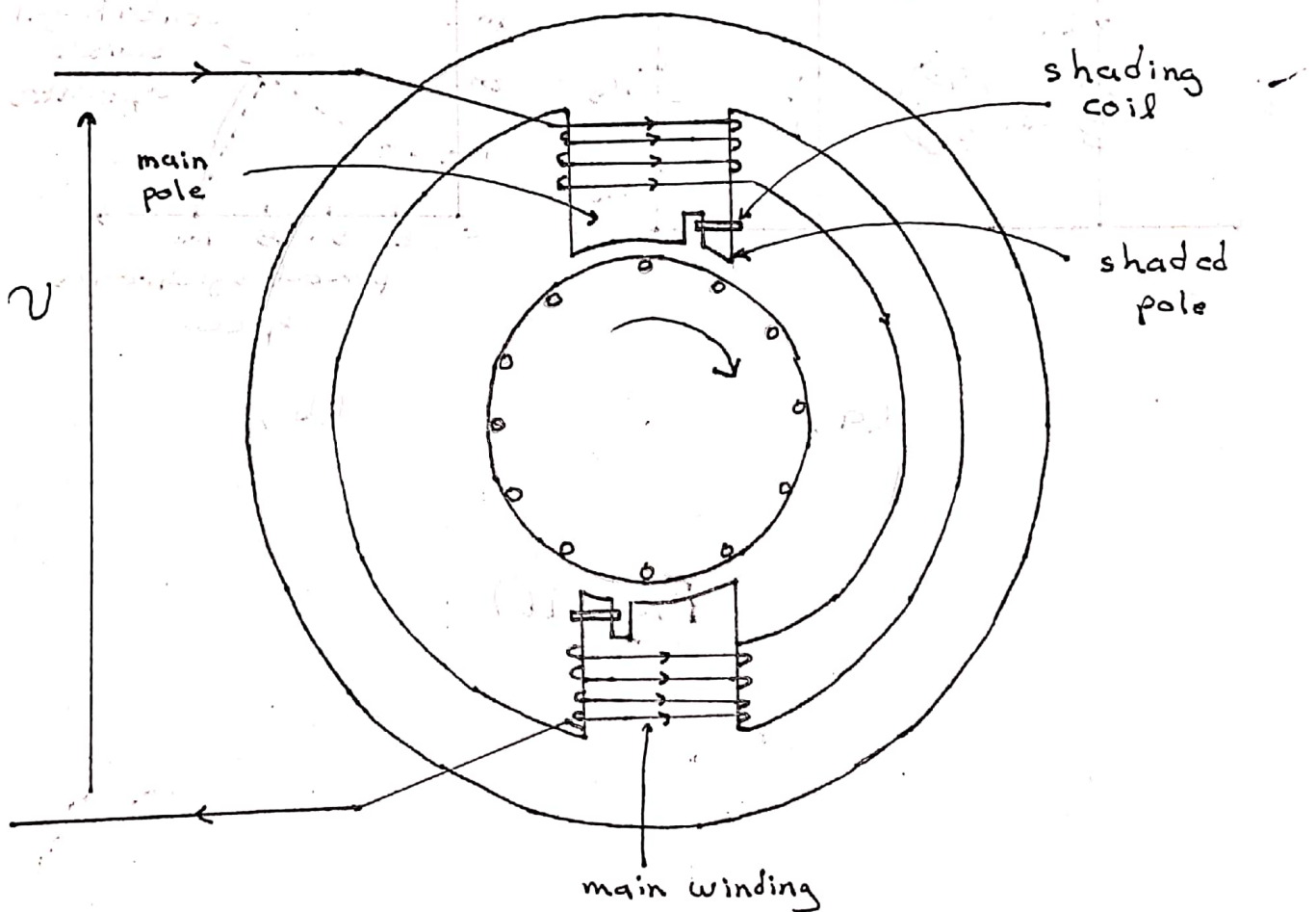
(a)

(b)

Fig. (16)

5- Shaded Pole motors

Figure (17) gives the schematic diagram of a shaded-pole motor. These motors employ salient pole construction and cage type rotor. A part of each pole carries a short-circuited ring of copper (or aluminium), called a shading coil. The main windings flux Φ_m is alternating in nature, it therefore induces emf E_{sc} in the shading coil by transformer action as shown in figure (17b). The magnitude of the ring current I_{sc} and its angle of lag behind E_{sc} , depend upon the impedance of the short-circuited shading coil. The current I_{sc} produces shading coil flux Φ_{sc} in phase with it.



(a)

Fig. 17 a.

Single phase motors

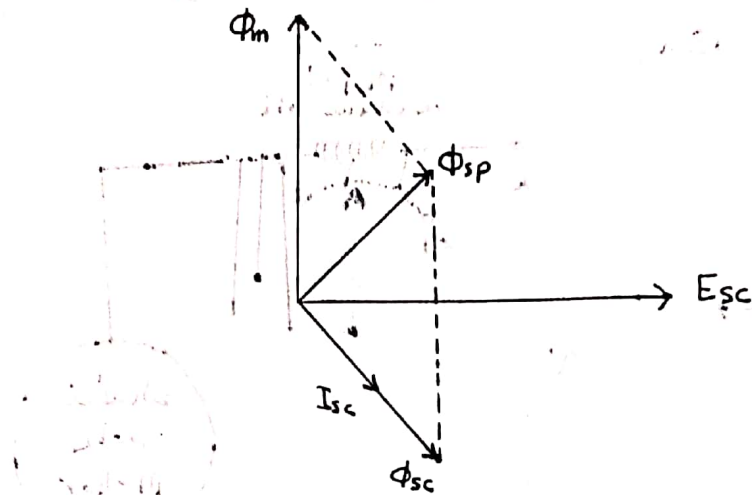
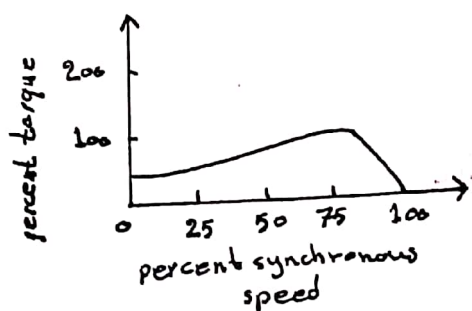


Fig. 17b

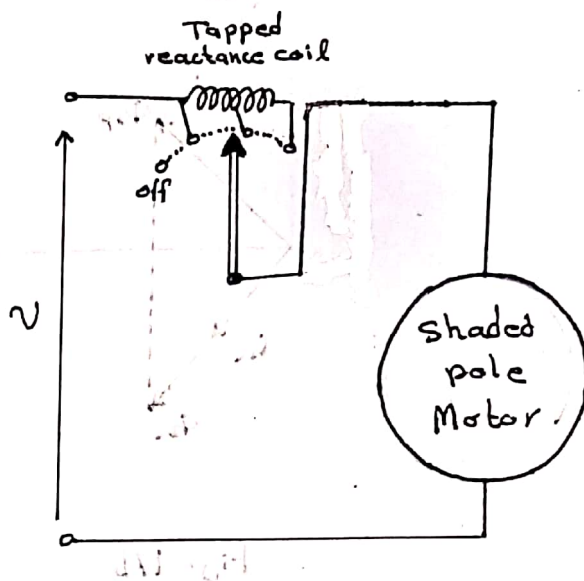
Now the shaded pole carries both Φ_m and Φ_{sc} , so that their phasor sum gives the total flux Φ_{sp} in the shaded pole. Since main pole flux Φ_m and shaded pole flux Φ_{sp} are having time phase displacement as shown in figure 17b, a rotating field is produced giving rise to a starting torque.

The main pole flux leads the shaded pole flux. In view of this, Φ_m reaches maximum first and a little time later determined by the time angle between Φ_m and Φ_{sp} , the shaded-pole flux Φ_{sp} , also reaches maximum. In other words, the rotating flux always rotates from unshaded pole to the shaded pole. Therefore, the rotor direction of rotation is from the unshaded to shaded pole as shown in figure 17a.

A typical torque-speed characteristics for this type of motors is illustrated in figure 18a



(a)



(b)

Fig: 18

The efficiency of this type of motor is low (20% to 50%). In spite of this fact, shaded pole motors are widely used in very small sizes, e.g. in small domestic fans, record-player motors, tape recorders, movie-projectors, blowers, etc. The speed of a shaded-pole motors can be controlled by three methods, but one that is commercially employed is the tapped reactance coil method, illustrated in figure 18b, which is self explanatory.