RAMA UNIVERSITY

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FACULTY OF ENGINEERING & TECHNOLOGY

Electrical Machine-ii

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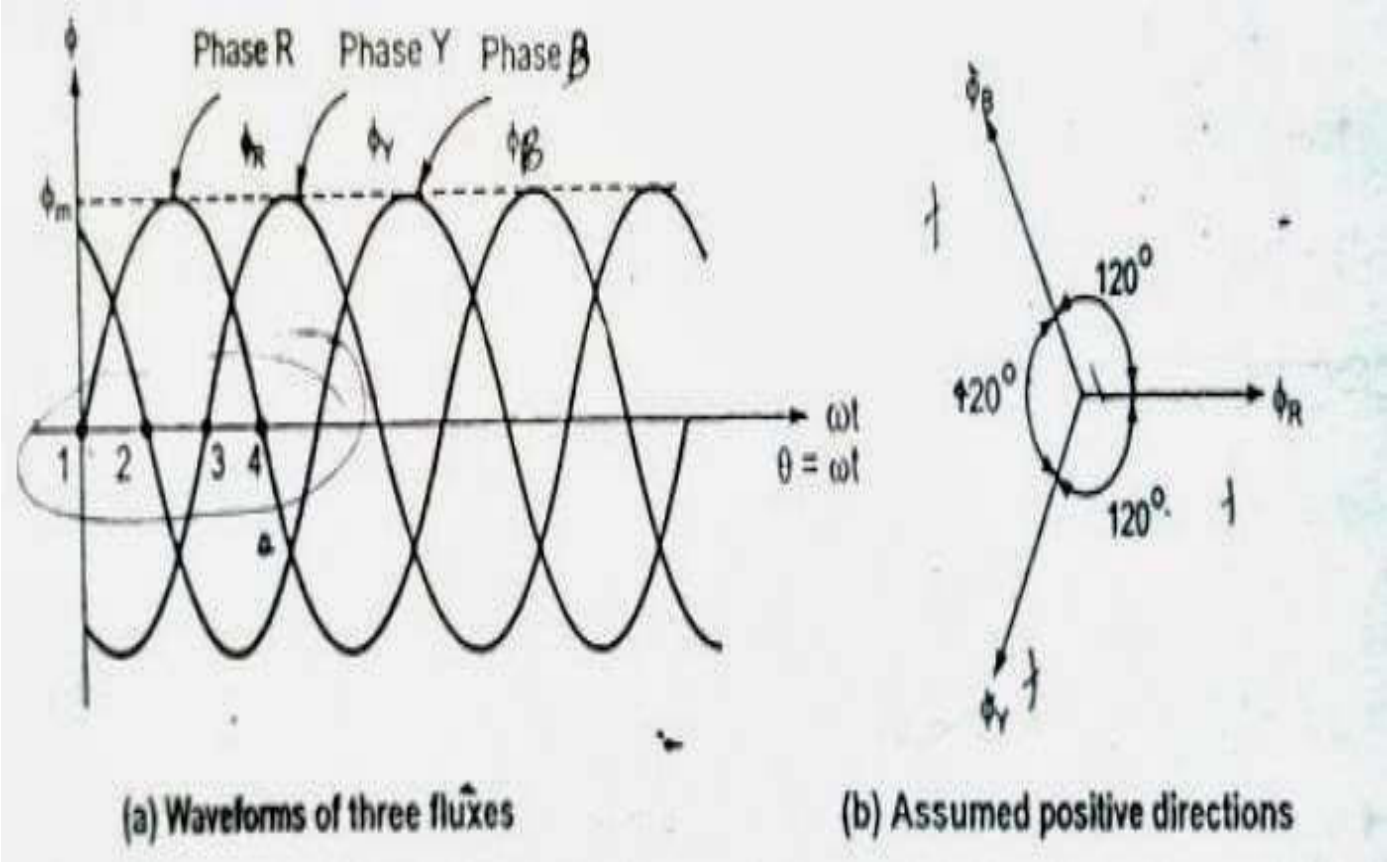
PRODUCTION OF RMF (CONT…):

As windings are identical and supply is balanced, the magnitude of each flux is Φm .



(a) Waveforms of three fluxes

(b) Assumed positive directions

INDUCTION MOTOR

- Case 1 : ωt = 0

ΦR = Φmsin(0) =0

ΦY = Φmsin(-120) = -0.866 Φm

ΦB = Φmsin(120) = +0.866 Φm

- Case 2 : ωt = 60

ΦR = Φmsin(60) = +0.866 Φm

ΦY = Φmsin(- 60) = -0.866 Φm

ΦB = Φmsin(- 180) = 0

- Case 3 : ωt = 120

ΦR = Φmsin(120) = +0.866 Φm

ΦY = Φmsin(180) = 0

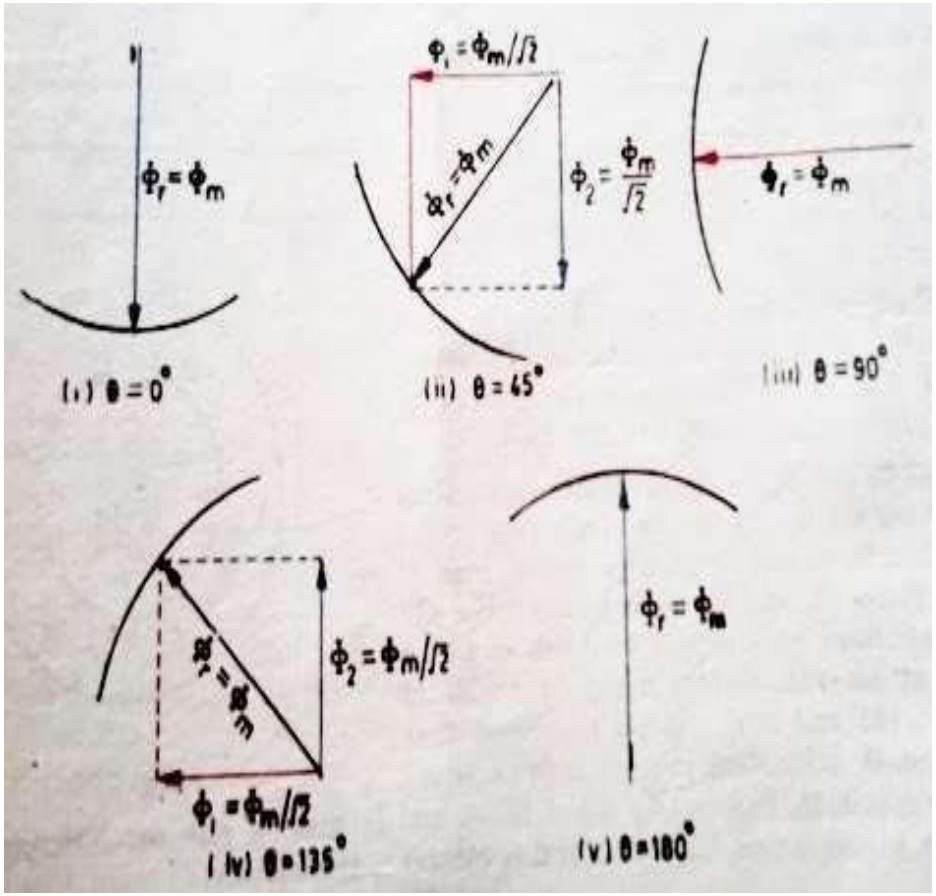
ΦB = Φmsin(-120) = -0.866 Φm

- Case 4 : ωt = 180

ΦR = Φmsin(180) =0

ΦY = Φmsin(60) =+.866 Φm

ΦB = Φmsin(-60) = -0.866 Φm



By comparing the electrical and phasor diagrams we can find the flux rotates one complete 360 degree on the 180 degree displacement of flux.

Conditions for Production of RMF

- The stator 3- phase winding should be placed at 120 degrees is space
- The current supply to these winding should be balanced.
- The direction of rotation of the magnetic field can be varied according to the phase sequence.
- A three-phase winding displaced in space by 120^0 is fed by a three-phase current displaced in time by 120^0:
- It produces a resultant magnetic flux which rotates in space as if actual magnetic poles were being rotated mechanically.

Conclusions:

- The magnitude of the Rotating magnetic field is always constant i.e. its value remains the same at any instant of time.
- The direction of RMF is decided according to the phase sequence of the winding
- The speed of rotation of the RMF is equal to the angular frequency of the supply voltage which in a way depends on the synchronous speed of the machine.

$$N_s = \frac{120f}{p} \quad \ldots (1)$$

$$\text{or} \quad f = \frac{pN_s}{120} \quad \ldots [1(a)]$$

The Reversal of Direction of Rotating Magnetic Field

The direction of the rotating magnetic field is reversed by changing the phase sequence to R-B-Y, i.e. changing only the connection of any two of the three phases, and keeping the third one same.