Sheet 2

A three-phase permanent-magnet stepper motor required for one particular application must be capable of controlling the position of a shaft in steps of 7.5°, and it must be capable of running at speeds of up to 300 r/min.

(a) How many poles must this motor have?

(b) At what rate must control pulses be received in the motor's control unit if it is to be driven at 300 r/min

A stepper motor has a step angle of 2.5º. Determine (a) resolution [step/rev] (b) number of steps required for the shaft to make 25 revolutions and (c) shaft speed, if the stepping frequency is 3600 pps.

A single-stack, 3-phase variable reluctance motor has a step angle of 15º. Find the number of its rotor and stator poles.

A hybrid VR stepping motor has 8 main poles which have been castellated to have 5 teeth each. If rotor has 50 teeth, calculate the stepping angle. .

Stepper motor has a step angle of 2.5º. Determine (a) resolution (b) number of steps required for the shaft to make 25 revolutions and (c) shaft speed, if the stepping frequency is 3600 pps.

A universal series motor has resistance of 30 Ω and an inductance of 0.5 H. When connected to a 250 V d.c. supply and loaded to take 0.8 A, it runs at 2000 r.p.m. Estimate its speed and power factor, when connected to a 250-V, 50-Hz a.c. supply and loaded to take the same current.

A 250-W, single-phase, 50-Hz, 220-V universal motor runs at 2000 rpm and takes 1.0 A when supplied from a 220-V dc. supply. If the motor is connected to 220-V ac supply and takes 1.0 A (r.m.s), calculate the speed, torque and power factor. Assume Ra = 20 Ω and La = 0.4 H.

A 8-kW, 4-pole, 220-V, 50-Hz reluctance motor has a torque angle of 30º when operating under rated load conditions. Calculate (i) load torque (ii) torque angle if the voltage drops to 205 V and (iii) will the rotor pulled out of synchronism ?

A small 60 Hz hysteresis motor possesses 32 poles. In making one complete turn with respect to the revolution field, the hysteresis loss in the rotor amount to 0.8 J. Calculate (i) the hysteresis torque, (ii) the maximum power output before the motor stall, (iii) the rotor losses when the motor is stalled, and (iv) the rotor losses when the motor runs at synchronous speed.