AMIRAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT : ELECTRICAL
SEMESTER: 7TH
SUBJECT NAME: DESIGN OF AC MACHINE
SUBJECT CODE : 2170909
FACULTY NAME: SUNIL PATEL

ASSIGNMENT: 1 DESIGN OF THREE PHASE INDUCTION MOTOR

1. Derive the equation for relationship between rating and size of the machine in case of three phase induction motor.

2. Determine the main dimensions of 20 kW, 3 phases, 400 V 50 Hz, 1450 rpm squirrel cage induction motor. Assume following:
   Full load efficiency: 85%. Full load power factor: 0.89 lag. Winding factor: 0.955. Specific magnetic loading: 0.45 wb/m2 Specific electrical loading 28000 A/m.
   Rotor peripheral speed 20 m/sec at synchronous speed.

3. Determine the main dimensions, turn per phase, number of slots, conductor section and slot area of a 3-phase, 5 H.P., 400 volts, 50 Hz, 1500 rpm squirrel cage induction motor. The machine is to be started by a star-delta starter. Assume:
   Average flux density in the air gap = 0.5 Wb/m2,ampere conductors per meter = 27000, efficiency = 0.8, power factor = 0.8 lagging at full load, winding factor =0.955, current density = 3.5 A/mm2.Choose main dimensions to give Good overall design.

4. Find the main dimensions, no of stator turns, and number of stator slots of a 30 H.P., 440 Volt, 3 phase, 50 Hz , 960 rpm, sq. cage Induction motor using following data: Specific magnetic loading=0.45wb/m2
   full load efficiency= 0.86, full load p.f. =0.87.Assume that stator winding is delta connected, for normal running. ,Sp.ele.loading=250amp.condctors/cm

5. Determine the main dimensions of 30 kW, 3 phases, 400 V 50 Hz, 1440 rpm squirrel cage induction motor. Assume following:
   Full load efficiency: 87%. Full load power factor: 0.9 lag Winding factor: 0.955. Specific magnetic loading: 0.5 wb/m2. Specific electrical loading 30000 A/m.
   Rotor peripheral speed 20 m/sec at synchronous speed.