

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-Vth Examination December 2010****Subject code: 150802****Subject Name: Electrical Machine****Date: 18 /12/ 2010****Time: 03.00 pm - 05.30 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain demagnetizing and cross magnetizing effects of armature reaction giving neat diagrams **08**
(b) Define: Back pitch, Front pitch, Commutator pitch **06**
- Q.2** (a) Write short note on Universal motor **07**
(b) Using double-revolving field theory, explain why a single phase induction motor is not self starting? **07**
- OR**
- (b) Write short note on Shaded pole induction motor **07**
- Q.3** (a) Draw the circle diagram from no-load and short-circuit test of a 3-phase, 14.92 kW, 400-V, 6-pole induction motor from following test results(line values) **10**
No-load : 400 V, 11 A, p.f.=0.2
Short circuit : 100 V, 25 A, p.f.=0.4
Rotor cu loss at standstill is same as stator cu loss. From the circle diagram find (i) line current, slip, efficiency and p.f. at full load (ii) the maximum torque
(b) Briefly explain double squirrel cage motor **04**
- OR**
- Q.3** (a) Draw the circle diagram for a 3-phase , 6-pole, 50 Hz, 400 V star connected induction motor from the following data(line values) **10**
No load : 400 V, 10 A, 1400 W
Short circuit : 200 V, 55 A, 7000 W
The stator cu loss at standstill is 60% of the total cu loss and full load current is 30 A. From circle diagram determine (i) slip, efficiency, p.f. torque and output at full load (ii) the maximum torque
(b) Explain the starting of 3-phase induction motor with star-delta starter **04**
- Q.4** (a) Explain with the help of connection and phasor diagram how scott connections are used to obtain 2-phase supply from 3-phase supply mains **07**
(b) Explain delta-star connection of 3-phase transformers. Also draw phasor diagram for phase shift 30° lead **07**
- OR**
- Q.4** (a) A 400 kVA load at 0.7 p.f. lagging is supplied by three 1-phase transformers connected in delta-delta. Each of the delta-delta transformers is rated at 200 kVA, 2300/230 V. If one of the defective transformer is removed from service, calculate for the V-V connection **07**
(i) The kVA load carried by each transformer (ii) percentage rated load carried by each transformer (iii) total kVA ratings of the transformer in V-V (iv) ratio of V-V bank to delta-delta bank transformer ratings

- (b) Explain the harmonic phenomena in (i)delta connected (ii)star connected winding of three phase transformers **07**
- Q.5** (a) Explain the operation of synchronous motor under constant load, varying excitation **07**
- (b) Give comparison between synchronous motor and induction motor **07**
- OR**
- Q.5** (a) Write short note on linear induction motor **07**
- (b) Describe the operation of variable reluctance stepper motor **07**
