

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – WINTER 2013****Subject Code: 150802****Date: 02-12-2013****Subject Name: Electrical Machines****Time: 10:30 pm to 01:00 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 the effect of variable excitation on the behavior of synchronous motor under constant load condition. **07**
- (b) Why Synchronous motors are not self starting? Explain. Also explain V and Inverted V curves of synchronous motor. **07**
- Q.2** (a) Describe the merits and demerits of various connections of three phase transformer. **07**
- (b) With the help of phasor diagram explain how two phase supply can be obtained from three phase supply using scott connection. **07**
- OR**
- (b) A 440 V d.c. shunt motor takes a no load current of 2.5 A (From Swinburne's Test). The resistance of the shunt field and the armature are 550 Ω and 1.2 Ω respectively. The Full load line current is 32 A. Find the full load output and the efficiency of the motor. **07**
- Q.3** (a) Draw the circle diagram for a 3.73 KW, 200 V, 50 Hz, 4-pole. 3-phase star-connected induction motor from the following data: **10**
- No-load: Line Voltage 200 V, Line Current 5 A, Total Input 350 W
Blocked rotor: Line Voltage 100 V, Line Current 26 A, Total Input 1700 W
Estimate from the circle diagram for full load condition, the line current, power factor and also the maximum torque in terms of the full – load torque. The rotor cu loss at standstill is half the total cu loss.
- (b) Explain the construction, operation and equivalent circuit of double cage induction motor. **04**
- OR**
- Q.3** (a) What are the conditions of parallel operation of three phase transformers? **07**
- (b) A Three phase step down transformer with per phase turns ratio is 47.6 : 1 connected in delta/star and is supplying a load of 400 KW, 0.8 p.f. lagging at 400 V. sketch the connection diagram and show in it different line voltages. Also calculate primary line current. **07**
- Q.4** (a) Using double-revolving field theory, explain why a single phase induction motor is not self starting? **07**
- (b) Write short note on shaded pole induction motor. **07**
- OR**
- Q.4** (a) Give Comparison between Synchronous motor and induction motor. **07**
- (b) With the help of phasor diagrams, discuss the behavior of synchronous motor with the constant field excitation and variable load. **07**
- Q.5** (a) A DC Generator is delivering the rated current with a brush shift in the direction of rotation. Neatly sketch and explain the distribution of flux density in the air gap due to (1) Main field MMF only (2) Armature MMF only and (3) Both main field and armature MMF. **07**

- (b) Describe Hopkinson's test in detail with its advantages and disadvantages. **07**
- OR**
- Q.5** (a) Discuss the construction, working, performance, advantages and disadvantages of PMDC (Permanent magnet DC) motor. **07**
- (b) Explain the construction and working of variable reluctance stepper motors. **07**
