

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III • EXAMINATION – WINTER 2013****Subject Code: 131701****Date: 30-11-2013****Subject Name: Electrical Machines****Time: 02.30 pm - 05.00 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) Derive the e.m.f. equation of a 1-phase transformer. Also prove that voltage per turn in primary and secondary is same. **07**
- (b) A 10 kva, 500/250 v, 50 hz, 1-phase transformer has a net area of cross section 30 cm^2 and max flux density is 1.2 Tesla. Calculate no of turns on both primary and secondary. **07**
- Q.2** (a) Explain the double revolving field theory for a single-phase induction Motor. **07**
- (b) Explain 3-point starter use to start DC motor. **07**
- OR
- (b) Develop equivalent circuit of a 1-phase transformer. Draw the phasor diagrams for no-load and load conditions. **07**
- Q.3** (a) Explain different parts of DC machine with neat and clean diagram. **07**
- (b) Explain crawling and cogging of an 3-phase induction motor. **07**
- OR
- Q.3** (a) Draw and explain the internal and external characteristics of d.c. shunt generators. **07**
- (b) Derive the condition for Maximum torque for induction motor and explain Torque - Slip characteristics. **07**
- Q.4** (a) State and explain condition of parallel operation of two 3-phase transformers **07**
- (b) Explain armature reaction in DC machines. **07**
- OR
- Q.4** (a) State the different methods of finding voltage regulation in alternator. explain any one of them in detail. **07**
- (b) State and explain condition of synchronizing alternator with infinite bus bar. **07**
- Q.5** (a) What is an auto transformer? Compare auto transformer vs. two winding transformer. **07**
- (b) A DC generator has an armature emf of 100 v. when the useful flux per pole is 20 m Wb, and the speed is 800 rpm. Calculate the generated emf (1) with the same flux and a speed of 1000 rpm (2) with flux per pole of 24 m Wb and a speed of 900 rpm. **07**
- OR
- Q.5** (a) Explain different speed control methods of 3-phase induction motor. **07**
- (b) A 3-phase induction motor has a full load speed of 960 rpm. Calculate the speed of rotor field with respect to rotor, stator and stator field. **07**
