

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-III Examination-Dec.-2011

Subject code: 131701

Date: 17/12/2011

Subject Name: Electrical Machine

Time: 2.30 pm -5.00 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) What do mean of an ideal transformer and derive emf equation of a single phase transformer. Also define Transformation Ratio. **07**
- (b) Obtain the equivalent circuit of a 200/400 –V ,50 Hz,1 Phase Transformer from the following test data **07**
O.C.Test : 200 V,0.7 A,70 W - on L.V. side
S.C. Test : 15 V, 10 A, 85 W - on H.V. side
Calculate the secondary voltage when delivering 5 KW at 0.8 p.f. lagging , the primary voltage being 200V
- Q.2** (a) Explain the various losses taking place in a transformer & Derive the equation for its maximum efficiency. Also define All Day Efficiency. **07**
- (b) Derive the condition for Maximum torque for induction motor and Explain Torque - Slip characteristics. **07**
- OR**
- (b) Write & Explain the condition of parallel operation of 3-phase transformer **07**
- Q.3** (a) Explain construction and working principle of d.c machine. **07**
- (b) A d.c. shunt machine while running as generator develops a voltage of 250 V at 1000 r.p.m. on no-load. It has armature resistance of $0.5\ \Omega$ and field resistance of $250\ \Omega$. When the machine runs as motor, input to it at no-load is 4 A at 250 V. Calculate the speed and efficiency of the machine when it runs as a motor taking 40 A at 250 V. Armature reaction weakens the field by 4 %. **07**
- OR**
- Q.3** (a) Explain the Swinburne's Test of a d.c. machine for finding losses with necessary diagram **07**
- (b) Draw and explain the internal & external characteristics of d.c. shunt generators. **05**
- (c) Explain the term 'Back emf' in respect to d.c.motor. **02**
- Q.4** (a) Write different starters used for 3 phase induction motor and explain any one of them. **07**

- (b) An 18.65 KW, 4 pole , 50 Hz, 3-phase induction motor has friction and windage losses of 2.5 percent of the output. The full load slip is 4 %. Compute for full load
(1) The rotor cu loss (2) The rotor input (3) The shaft torque (4) The gross electromagnetic torque **07**

OR

- Q.4** (a) Explain different speed control methods for 3 phase induction motor. **07**
(b) Explain the procedure to construct the circle diagram for induction motor & how various quantities are measured from circle diagram. **07**

- Q.5** (a) Define voltage regulation of an alternator & explain any one method to find the voltage regulation **07**

- (b) Explain the Various types of cooling method in rotating machine. **07**

OR

- Q.5** (a) What is Synchronizing of an alternator? Explain any one method for Synchronizing. **07**

- (b) What do you mean of hunting in Synchronous Machine **03**

- (c) Derive equation of emf for an alternator **04**
