

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-Vth Examination December 2010****Subject code: 150901****Subject Name: Electrical Machine-II****Date: 13 /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) Draw vector & winding diagram for diff. phase groups of 3-phase transformer. **07**
(b) Explain performance of 3-phase I.M. for change in supply frequency with constant supply voltage. **07**

- Q.2** (a) Explain polarity testing of 3-phase transformer.. **07**
(b) State the necessary conditions for parallel operation of two 3-phase transformer. **07**
Also explain in detail adverse effect of unequal % impedance.

OR

- (b) A 120 KVA , 6600/400 V star-star 3-phase , 50 Hz x'mer has an iron loss of 1600 W. The max. efficiency occurs at $\frac{3}{4}$ full load. Find the efficiency of x'mer at
(1) full load and 0.8 p.f. lag.
(2) half load and unity p.f.
(3) the max. efficiency **07**

- Q.3** (a) Explain effect of unequal supply voltage on performance of 3-phase I.M. **07**
(b) A 25 HP ,415 V ,50 Hz , 4 pole, delta connected I.M. has the following impedances per phase in ohms referred to stator side. **07**
Stator resi. 0.041 ohm , rotor resi =0.332 ohm , stator reactance = 1.106 ohm,
rotor reactance = 0.464 ohm, magnetising reactance = 26.30 ohm.
Rotational losses are assumed constant = 1.1 KW.
Core losses are neglected.
If the slip =3.2 % at rated voltage and frequency, find
(1) Speed (2) stator current (3) power factor
(4) out put and input power (5) % efficiency

OR

- Q.3** (a) A 750 HP 415 V, 3-phase, 50 Hz, 12 pole I.M. has a rotor impedance of (0.02+j0.15) ohms at standstill. Full load torque is obtained at 480 RPM. **07**
Calculate (1) Ratio of max. to full load torque.
(2) Speed at max. torque.
(3) Rotor resistance required to be added to get max. starting torque.
(b) Derive the condition of max. torque of Induction Motor. **07**
Also explain factors affecting max. torque condition.

- Q.4** (a) Explain construction & working of Universal motor. **07**
(b) Explain equivalent circuit of single phase Induction motor. **07**

OR

- Q.4** (a) Explain with winding and phasor diagram, working of capacitor start and run 1-phase I.M. **07**
- (b) Explain why plain single phase motor is not self starting? **07**
List out the applications of different types of 1-phase I.M.
- Q.5** (a) Explain operating principle of Induction Generator **07**
- (b) Explain principle of magnetic levitation. **07**
- OR**
- Q.5** A-3 phase 14.9 kw, 400 V, 4-pole, Induction motor, gave the following test readings. **14**
 No load : 400 V, 1250 W, 9 A
 Block rotor : 150 V, 4 KW, 38 A
 Draw the circle diagram and find input current, speed, power factor, at full load.
 Also find max. torque and power.
