Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- Vth SEMESTER–EXAMINATION – MAY/JUNE - 2012

Subject code: 150901 **Date: 01/06/2012**

Subject Name: Electrical Machine –II

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)** Explain: **06**

(i) Importance of polarity test for parallel operation of two 3-Φ transformer.

(ii) If three single phase transformers are connected in delta arrangement and one of the transformer gets damaged, is it possible to maintain continuity of supply with the remaining two transformers? If yes how.

(iii)Why the power factor of squirrel cage induction motor is low at light loads and it improves as we increase the load on it.

(b) Answer in brief. **08**

(i) What is the advantage of star-connection over delta connection in a 3-Φ transformer.

(ii) State the difference between DOL starter and Star-delta starter.

(iii) Explain how by inserting resistance in the rotor circuit of a slip-ring induction motor the starting current of the motor can be limited.

(iv) Differentiate between on-load and off-load tap changer.

Q.2 **(a)** Discuss the applications of different transformer connection. Also draw the vector and winding diagram for the following 3-Φ transformer connections Dz0, Dd6, Dy1, Yz1, Dy11, Yz11 **07**

(b) Explain Scott-connection of transformer in detail. Also compare it with open – delta connection. **07**

OR

(b) A 120 KVA , 3-Φ , 550 Hz , 6600/400-V transformer is delta connected on H.V. side and star connected on L.V. side. The resistance of HV winding is 4.5 Ω/phase and of LV winding is 0.04 Ω/phase. If its full load efficiency is 95% at 0.85 p.f. (lag) , Calculate **07**

(i) Iron losses & copper losses at full load.

(ii) Efficiency of transformer at half load and 0.8 p.f. (lead)

Q.3 **(a)** With the help of a neat diagram explain parallel operation of two 3-Φ transformer. Also explain the essential & desirable conditions to be fulfilled for operating two 3-Φ transformers in parallel. **07**

(b) A 415-V, 3-Φ , 50 Hz, 4 pole star connected induction motor takes a line current of 11A with 0.85 p.f. lagging. Its total stator losses are 6% of the input. **07**

Rotor copper losses are 4% of the input to the rotor, mechanical losses are 3% of the rotor input. Calculate (i) slip and rotor speed (ii) torque developed in the rotor and (iii) shaft torque

OR

Q.3 **(a)** Explain the working, equivalent circuit and advantages of double squirrel cage induction motor. **07**

(b) A 230-V , 3-Φ, 4-pole,50Hz , star connected induction motor is rated 3-KW. The equivalent circuit parameters are: **07**
R_1=0.4Ω , X_1=0.9Ω, R_2'=0.4 Ω and X_2'=0.7 Ω, X_0=20 Ω.
The stator core losses 45 W and rotational loss is 100 W. For a slip of 0.03 find (i) input current (ii) power factor (iii) air gap power (iv) mechanical power (v) output power and efficiency.

Q.4 **(a)** Draw the circle the circle diagram for 5KW , 400-V, 3- Φ ,4 pole 50 Hz, slip-ring induction motor from the following data: **14**
No-load readings : 400 V , 5.2 A , 360W
Blocked test readings : 95 V, 10 A, 700 W
The ratio of primary to secondary turns is 2.62, Stator resistance per phase is 0.7 Ω and of the rotor is 0.175 Ω. Calculate

(i) Full-load current (ii) full load slip
(iii) full- load power factor (iv) rotor copper losses
(v) Stator copper loss (vi) maximum torque in synch.watt
(vii) Efficiency (viii) Actual speed

OR

Q.4 **(a)** Explain the phenomenon of cogging and crawling in induction motor. **07**

(b) State different methods of speed control of 3- Φ Induction motor. Explain any one method of speed control of 3- Φ slip ring induction motor from the rotor side. **07**

Q.5 **(a)** Draw the constructional features and operating characteristics of shaded pole motor. Also state its application. **07**

(b) Explain the working principle of induction generator. Also mention its application. **07**

OR

Q.5 **(a)** Discuss constructional features, working and application of Schrage motor in detail. **07**

(b) Write short note on: **07**

(i) A.C series motor
(ii) Concept welding transformer

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