Kafrelsheikh University
Faculty of Engineering
Subject: **Electrical testing3**
Year: Fourth Electrical power (R. 2007)
Exam Date: 18/3/2021

Final Exam of 1st semester-2020-2021
Department of Electrical Engineering
course code: EPM4014 Full Mark: 60 Marks
number of pages: 2 Time allowed: 3 hours

This exam measures the following ILOs **(a19, b19, c5, c13,c14, c15,c16, d1)**

Attempt to solve all questions

Q1: (15 Marks)

a) **How** would the starting current of the Y-connected motor compare to the starting current if the motor remained in a Δ-connection during starting? [5 Marks]

b) **Plot**, with all necessary measuring devices, the connection diagram of toque-speed characteristic test of an IM. [5 Marks]

c) A 460-V, 60 Hz, 3-phase, star-connected induction motor have the following torque speed data:

T N.m.	0	149	148.2	144.1	138.4	132	125.5	123	119.2
n (rpm)	1800	1008	900	720	540	360	180	108	0

Plot the torque-slip characteristic, from characteristic determines: no of poles, starting torque, if this motor is loaded by constant load at 50, 125 Nm what are motor speed and its slip. [5 Marks]

Q2: (15 Marks)

a- **Describe** and mention the required preliminary precautions at the locked-rotor test of the IM. [5 Marks]

b- **Discuss** three main practical problems that lead to IM failure. Show the necessary procedures that alleviate these harmful effects. [5 Marks]

c- **No-load** and blocked rotor test were performed on a 400 V, 3-phase delta-connected inductions motor and the following results were obtained:

No-load test: 400 V; 2.5A; 600 W

Blocked-rotor test: 200 V; 12.5 A; 1500 W

Determine energy (or working)component and magnetising component of no-load current, noload power factor, exciting resistance and reactance per phase referred to stator (primary) side assuming that friction and winding lasses are 180 W.

Also determine equivalent resistance and reactance of the motor referred to stator side as well as current and power factor on short circuit with normal rated voltage of 400 V assuming that the stator winding resistance per phase is 5 ohm. [5 Marks]

Q3: (15 Marks)

Regarding the induction generator:

a- **Draw** the electrical circuit connection diagrams of a test to determine the magnetization curve. [5 Marks]

b- **Discuss** briefly the importance of the capacitor bank connects at the terminals of the induction generator. [5 Marks]

c- **Discuss** briefly the effect of loading on the load voltage and frequency. [5 Marks]

Q4: (15 Marks)

Choose the correct answer with explain your choice.

1 Blocked rotor test on induction motors is used to find out:
a) Leakage reactance b) Power factor on short circuit c) Short-circuit current under rated voltage d) All of the above.

2. A change of 4% of supply voltage to an induction motor will produce a change of approximately
a) 4% in the rotor torque b) 8% in the rotor torque c) 12% in the rotor torque d) 16% in the rotor torque

3. In the circle diagram for induction motor, the diameter of the circle represents
a) Slip b) Rotor current c) Running torque d) Line voltage

4. Short-circuit test on an induction motor cannot be used to determine
a) Windage losses b) Copper losses c) Transformation ratio d) Power scale of circle diagram

5. A 3-phase induction motor with its rotor blocked behaves similar to a
a) transformer under short circuit of secondary terminals b) transformer under open circuit of secondary c) synchronous motor under slip test d) synchronous motor under open circuit

6. No load current in induction motor is 10-20% of full load current and the no load current of transformer is 2-6%.
a) True b) False

7. At no load induction motor has possible power factor as ___
a) 0.2 b) 0.5 c) 0.65 d) None of the above

8. In an induction generator operation, the slip is always:
a) Infinite b) Positive c) Negative d) Zero

9. Which of the following losses are negligible in blocked rotor test?
a) 1-Mechanical losses b) 2-Iron losses c) Both 1 & 2 d) None of the above

10. (I) Even at no load a large 3-phase squirrel- cage induction motor is started at reduced voltage than rated.
(II) If a large 3--phase squirrel-cage induction motor with no load is started at full voltage, it will be damaged.
a) I is true, II is false b) I is true and II is also true c) I is false, II is true d) I and II are false

With my best wishes

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