Kafrelsheikh University
Faculty of Engineering
Subject: **Electrical testing (3)**
Year: Fourth Electrical power (R. 2007)
Exam Date: 16/6/2021

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

This exam measure the following LOs (a2, a5, a8, b2,b3, b4, c2, c3)

Answer as much as you can

Q1:   (15 Mark)

a- **Describe** the tests used to determine the single phase induction motor equivalent circuit.

[5 Marks]

The following readings are taken from the results of open- and short-circuit test on a 5000-kVA, 4160-V, 3-phase, 4-pole, 1800-rpm synchronous motor driven at rated speed:

Field current, A	192	169
Armature current, short-circuit test, A	694	790
Line voltage, open-circuit test, V	3920	4160
Line voltage, air-gap line, open-circuit test, V	4640	5270

The armature resistance is 11 mΩ/phase. The armature leakage reactance is 0.12 PU. **Find** (a) the short-circuit ratio, (b) Saturated value of the armature reactance in ohms per phase and per unit, (c) Unsaturated armature reactance in per unit and in ohms per phase.   [10 Marks]

Q2:   (15 Mark)

a) **Explain** the tests used to determine the synchronous reactance of synchronous motor?

[5 Marks]

b) Following data is taken from no-load, locked rotor, and DC tests of a 3-phase, wye connected 40 HP, 60 Hz, 460 V, induction motor with a rated current of 57.8 A. The locked-rotor test is made at 15 Hz to minimize the errors due to saturation and skin effects. **Determine** the motor parameters and the total core, friction and windage losses. **Draw** the approximate equivalent circuit for the motor.   [10 Marks]

	Lock-rotor	No-load		DC Test
V_{line}	36.2 V	460.0 V	V_{dc}	12.0 V
I_{line}	58.0 A	32.7 A	I_{dc}	59.0 A
P_T	2573.4 W	4664.4 W		

Q3:   (15 Mark)

a) **Describe** the load test of a single phase induction motor test.   [5 Marks]

b) **Why** is the starting torque of a capacitor start induction motor high, when compared to that of a split phase induction motor?   [5 Marks]

c) **Why** single phase induction motors are not self-starting?   [5 Marks]

Q4:   (15 Mark)

Choose the correct answer with **explain** your choice.

1. In a split phase motor, the ratio of number of turns for starting winding to that for running winding is
   (A) very high (B) more than 1 (C) 1 (D) less than 1.

2. Which of the following motors will operate at high power factor ?
   (A)Shaped pole motor (B) Split phase motor (C) Capacitor run motor (D) Capacitor start motor

3. A 10 pole AC generator rotates at 1200 rpm. The frequency of AC voltage in cycles per second will be

Kafrelsheikh University
Faculty of Engineering
Subject: **Electrical testing (3)**
Year: Fourth Electrical power (R. 2007)
Exam Date: 16/6/2021

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

(A)120 (B)60 (C) 160 (D) 100

4. The output frequency of an alternator depends on

(A)Type of winding (B) Number of poles and Rotational speed (C) Numbers of poles only (D Rotational speed only

5. If the input to the prime mover of an alternator is kept constant but the excitation is changed, then the

(A)The active component of the output is changed (B) The power factor remains constant (C) Reactive components of the output are changed (D) The power factor is reduced

6. When an alternator is running on no-load the power supplied by the prime mover of an alternator goes to

(A)Meets copper loss and winding loss in an armature (B) Meet no-load looses (C) Meet iron losses (D) Produce E.M.F in the armature winding

7. The power factor of an alternator depends on

(A)Speed of Motor (B) Core losses (C) Armature losses (D) Type of load

8. The drive motor used in a mixer-grinder is a

(A) dc motor. (B) induction motor.   (C) synchronous motor.   (D) universal motor.

9. A centrifugal switch is used to disconnect starting winding when motor has

(A) run for about 1 minute (B)run for about 5 minutes (C) picked up about 50 to 75 per cent of rated speed (D) picked up about 10 to 25 per cent of rated speed.

10.In repulsion motor direction of rotation of motor

(A) is opposite to that of brush shift   (B) is the same as that of brush shift   (C) is independent of brush shift.

11.Which type of rotor is best for a turbo-alternator?

(A)Salient pole type (B) Cylindrical rotor type (C) Salient pole & Cylindrical rotor (D) Non-salient pole type

12.An alternator is generating power at 210 V per phase while running at 1500 RPM. If the speed of an alternator drops to 1000 rpm the generated voltage per phase will be

(A)140 V (B) 150 V (C) 110 V (D) 230 V

13.An alternator is said to be over-excited when it is operating at

(A)Leading Power Factor (B) Lagging Power Factor (C) Unity Power Factor (D) Leading & Lagging PF

14.In induction motor, small air gap........power factor and ....noise level

(A)Increase........reduces (B) reduces .... Increase (C) reduces....also reduces (D) increases......also increases

15.In squirrel cage motors, skin effect occurs in

A) stator winding B)rotor winding   C)both (A) and (B)   D)none of the above

With my best wishes
_Associate Prof../Mohamed I. Abd EL_Wanis_