Code No: 07A40202 **R07** **Set No. 2**

II B.Tech II Semester Examinations,April/May 2012
ELECTRICAL MACHINES - II
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) In a transformer, core flux depends on voltage, whereas the leakage fluxes depend on the currents. Explain.
   (b) Draw the equivalent circuit for a 3000/400 V, 1-phase transformer refered to the primary side, on which the following test results were obtained.
   H.V. side : 3000 V, 0.5 A, 500 W
   L.V. side : 11 V, 100 A, 500 W [8+8]

2. Describe the four possible ways of connections of 3-phase transformers with relavant relations amongst voltages and currents on both h.v. and l.v. sides. [16]

3. Draw the circle diagram for a 400V, 5HP delta connected induction motor from the following data
   No load:400V, 3.0 A, cos θ_0=0.2
   Locked rotor: 200V, 12A, cosθ_{sc}=0.4
   From the circle diagram determine
   (a) Full load current, full load power factor
   (b) Starting torque in terms of full load torque at normal voltage
   Assume that the copper losses are equally divided between stator and rotor. [16]

4. (a) What causes a change in secondary terminal voltage of a transformer, as it is loaded? Enumerate the factors which influence the magnitude of this change.
   (b) The constants of a single phase, 2200/220 V, 50 Hz transformer are as follows:
   H.V. side : $R_1 = 0.21\Omega$, $X_1 = 3.84\Omega$
   L.V. side : $R_2 = 0.006\Omega$, $X_2 = 0.022\Omega$
   Find the equivalent circuit parameters refered to H.V. side? [8+8]

5. (a) Distinguish between step-up and step-down transformer. State clearly the quantities which remain unaltered or get stepped-up or stepped-down.
   (b) A 10 KVA, 440/220V, 400Hz transformer is desired to be used at a frequency of 60 Hz. Find the voltage as well as KVA rating of the transformer at this reduced frequency. [8+8]

6. (a) Develop the equivalent circuit of a poly phase induction motor. Explain how its equivalent circuit is similar to transformer equivalent circuit.
   (b) A 3 phase induction motor runs at almost 1000 rpm at no load and 950 rpm at full load when supplied with power from a 50 Hz line.
      i. How many poles the motor has?

ii. What is the percentage slip at full load?

iii. What is the corresponding speed of the rotor field with respect to the rotor?

iv. What is the corresponding frequency of the corresponding voltage?

v. What is the rotor frequency at the slip of 10%? [8+8]

7. (a) Explain briefly the different methods of speed control from stator side of 3 phase induction motor.

   (b) A 3 phase, 4 pole, 50 Hz induction motor and a 3 phase, 6 pole, 50 Hz induction motor are connected in cumulative cascade. The frequency in the secondary circuit of the 6 pole motor is observed to be 1Hz. Determine the slip in each machine and the combined speed of the set . [8+8]

8. Explain the following:

   (a) Why an induction motor can not develop torque when running at synchronous speed?

   (b) Why the power factor of a lightly loaded induction motor is quite low?

   (c) Why in some induction motors double cages are provided? [6+5+5]

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Code No: 07A40202 **R07** **Set No. 4**

II B.Tech II Semester Examinations,April/May 2012
ELECTRICAL MACHINES - II
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain briefly the different methods of speed control from stator side of 3 phase induction motor.
   (b) A 3 phase, 4 pole, 50 Hz induction motor and a 3 phase, 6 pole, 50 Hz induction motor are connected in cumulative cascade. The frequency in the secondary circuit of the 6 pole motor is observed to be 1Hz. Determine the slip in each machine and the combined speed of the set . [8+8]

2. Draw the circle diagram for a 400V, 5HP delta connected induction motor from the following data
   No load:400V, 3.0 A, cos θ_0=0.2
   Locked rotor: 200V, 12A, cosθ_{sc}=0.4
   From the circle diagram determine
   (a) Full load current, full load power factor
   (b) Starting torque in terms of full load torque at normal voltage
   Assume that the copper losses are equally divided between stator and rotor. [16]

3. (a) In a transformer, core flux depends on voltage, whereas the leakage fluxes depend on the currents. Explain.
   (b) Draw the equivalent circuit for a 3000/400 V, 1-phase transformer refered to the primary side, on which the following test results were obtained.
   H.V. side : 3000 V, 0.5 A, 500 W
   L.V. side : 11 V, 100 A, 500 W [8+8]

4. (a) What causes a change in secondary terminal voltage of a transformer, as it is loaded? Enumerate the factors which influence the magnitude of this change.
   (b) The constants of a single phase, 2200/220 V, 50 Hz transformer are as follows:
   H.V. side : $R_1 = 0.21\Omega$, $X_1 = 3.84\Omega$
   L.V. side : $R_2 = 0.006\Omega$, $X_2 = 0.022\Omega$
   Find the equivalent circuit parameters refered to H.V. side? [8+8]

5. Explain the following:
   (a) Why an induction motor can not develop torque when running at synchronous speed?
   (b) Why the power factor of a lightly loaded induction motor is quite low?
   (c) Why in some induction motors double cages are provided? [6+5+5]

6. (a) Distinguish between step-up and step-down transformer. State clearly the quantities which remain unaltered or get stepped-up or stepped-down.
   (b) A 10 KVA, 440/220V, 400Hz transformer is desired to be used at a frequency of 60 Hz. Find the voltage as well as KVA rating of the transformer at this reduced frequency. [8+8]

7. Describe the four possible ways of connections of 3-phase transformers with relavant relations amongst voltages and currents on both h.v. and l.v. sides. [16]

8. (a) Develop the equivalent circuit of a poly phase induction motor. Explain how its equivalent circuit is similar to transformer equivalent circuit.
   (b) A 3 phase induction motor runs at almost 1000 rpm at no load and 950 rpm at full load when supplied with power from a 50 Hz line.
      i. How many poles the motor has?
      ii. What is the percentage slip at full load?
      iii. What is the corresponding speed of the rotor field with respect to the rotor?
      iv. What is the corresponding frequency of the corresponding voltage?
      v. What is the rotor frequency at the slip of 10%? [8+8]

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Code No: 07A40202 **R07** **Set No. 1**

II B.Tech II Semester Examinations,April/May 2012
ELECTRICAL MACHINES - II
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Draw the circle diagram for a 400V, 5HP delta connected induction motor from the following data
   No load:400V, 3.0 A, cos θ_0=0.2
   Locked rotor: 200V, 12A, cosθ_{sc}=0.4
   From the circle diagram determine
   (a) Full load current, full load power factor
   (b) Starting torque in terms of full load torque at normal voltage
   Assume that the copper losses are equally divided between stator and rotor. [16]

2. (a) What causes a change in secondary terminal voltage of a transformer, as it is loaded? Enumerate the factors which influence the magnitude of this change.
   (b) The constants of a single phase, 2200/220 V, 50 Hz transformer are as follows:
   H.V. side : $R_1 = 0.21\Omega$, $X_1 = 3.84\Omega$
   L.V. side : $R_2 = 0.006\Omega$, $X_2 = 0.022\Omega$
   Find the equivalent circuit parameters refered to H.V. side? [8+8]

3. (a) Explain briefly the different methods of speed control from stator side of 3 phase induction motor.
   (b) A 3 phase, 4 pole, 50 Hz induction motor and a 3 phase, 6 pole, 50 Hz induction motor are connected in cumulative cascade. The frequency in the secondary circuit of the 6 pole motor is observed to be 1Hz. Determine the slip in each machine and the combined speed of the set . [8+8]

4. Explain the following:
   (a) Why an induction motor can not develop torque when running at synchronous speed?
   (b) Why the power factor of a lightly loaded induction motor is quite low?
   (c) Why in some induction motors double cages are provided? [6+5+5]

5. Describe the four possible ways of connections of 3-phase transformers with relavant relations amongst voltages and currents on both h.v. and l.v. sides. [16]

6. (a) Develop the equivalent circuit of a poly phase induction motor. Explain how its equivalent circuit is similar to transformer equivalent circuit.
   (b) A 3 phase induction motor runs at almost 1000 rpm at no load and 950 rpm at full load when supplied with power from a 50 Hz line.

i. How many poles the motor has?
ii. What is the percentage slip at full load?
iii. What is the corresponding speed of the rotor field with respect to the rotor?
iv. What is the corresponding frequency of the corresponding voltage?
v. What is the rotor frequency at the slip of 10%? [8+8]

7. (a) Distinguish between step-up and step-down transformer. State clearly the quantities which remain unaltered or get stepped-up or stepped-down.
   (b) A 10 KVA, 440/220V, 400Hz transformer is desired to be used at a frequency of 60 Hz. Find the voltage as well as KVA rating of the transformer at this reduced frequency. [8+8]

8. (a) In a transformer, core flux depends on voltage, whereas the leakage fluxes depend on the currents. Explain.
   (b) Draw the equivalent circuit for a 3000/400 V, 1-phase transformer refered to the primary side, on which the following test results were obtained.
   H.V. side : 3000 V, 0.5 A, 500 W
   L.V. side : 11 V, 100 A, 500 W [8+8]

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Code No: 07A40202 **R07** **Set No. 3**

II B.Tech II Semester Examinations,April/May 2012
ELECTRICAL MACHINES - II
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What causes a change in secondary terminal voltage of a transformer, as it is loaded? Enumerate the factors which influence the magnitude of this change.
   (b) The constants of a single phase, 2200/220 V, 50 Hz transformer are as follows:
   H.V. side : $R_1 = 0.21\Omega$, $X_1 = 3.84\Omega$
   L.V. side : $R_2 = 0.006\Omega$, $X_2 = 0.022\Omega$
   Find the equivalent circuit parameters refered to H.V. side? [8+8]

2. (a) In a transformer, core flux depends on voltage, whereas the leakage fluxes depend on the currents. Explain.
   (b) Draw the equivalent circuit for a 3000/400 V, 1-phase transformer refered to the primary side, on which the following test results were obtained.
   H.V. side : 3000 V, 0.5 A, 500 W
   L.V. side : 11 V, 100 A, 500 W [8+8]

3. Explain the following:
   (a) Why an induction motor can not develop torque when running at synchronous speed?
   (b) Why the power factor of a lightly loaded induction motor is quite low?
   (c) Why in some induction motors double cages are provided? [6+5+5]

4. Draw the circle diagram for a 400V, 5HP delta connected induction motor from the following data
   No load:400V, 3.0 A, cos θ_0=0.2
   Locked rotor: 200V, 12A, cosθ_{sc}=0.4
   From the circle diagram determine
   (a) Full load current, full load power factor
   (b) Starting torque in terms of full load torque at normal voltage
   Assume that the copper losses are equally divided between stator and rotor. [16]

5. Describe the four possible ways of connections of 3-phase transformers with relavant relations amongst voltages and currents on both h.v. and l.v. sides. [16]

6. (a) Distinguish between step-up and step-down transformer. State clearly the quantities which remain unaltered or get stepped-up or stepped-down.
   (b) A 10 KVA, 440/220V, 400Hz transformer is desired to be used at a frequency of 60 Hz. Find the voltage as well as KVA rating of the transformer at this reduced frequency. [8+8]

7. (a) Explain briefly the different methods of speed control from stator side of 3 phase induction motor.

   (b) A 3 phase, 4 pole, 50 Hz induction motor and a 3 phase, 6 pole, 50 Hz induction motor are connected in cumulative cascade. The frequency in the secondary circuit of the 6 pole motor is observed to be 1Hz. Determine the slip in each machine and the combined speed of the set . [8+8]

8. (a) Develop the equivalent circuit of a poly phase induction motor. Explain how its equivalent circuit is similar to transformer equivalent circuit.

   (b) A 3 phase induction motor runs at almost 1000 rpm at no load and 950 rpm at full load when supplied with power from a 50 Hz line.

   i. How many poles the motor has?
   ii. What is the percentage slip at full load?
   iii. What is the corresponding speed of the rotor field with respect to the rotor?
   iv. What is the corresponding frequency of the corresponding voltage?
   v. What is the rotor frequency at the slip of 10%? [8+8]

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