Code No: NR220205 **NR** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
ELECTRO MECHANICS - 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) Sketch and discuss the typical torque-speed characteristics of an induction motor.
   (b) A 3-phase wound rotor induction motor develops a maximum torque of 4 times the full load torque at slip of 0.20. The per phase rotor resistance is 0.04Ω. The stator resistance and rotational losses are negligible. Calculate the value of external resistance that must be inserted in the rotor circuit in order to minimize torque at starting. [8+8]

2. (a) What are the various methods to reduce the leakage flux in transformer.
   (b) Draw the phasor diagram of a single phase transformer with load having a leading power factor and explain. [7+9]

3. A 4KVA, 200/400V, 50Hz, single phase transformer gave the following test results: No-load : low voltage data, 200V, 0.7A, 60W., Short-circuit : High voltage data, 9V, 6A, 21.6W. Calculate:
   (a) The magnetizing current and the component corresponding to iron loss at normal voltage and frequency,
   (b) The efficiency on full load at unity power factor,
   (c) The secondary terminal voltage on full-load at power factors of unity, 0.8 lagging and 0.8 leading. [6+5+5]

4. (a) Discuss the points of similarities between a transformer and an induction machine. Hence, explain why an induction machine is called a generalized transformer.
   (b) Explain why an induction motor, at noload, operates at a very low power factor. [8+8]

5. (a) Explain the method of emf injection for controlling speed of slip ring induction motor with the help of necessary diagrams and above and below the synchronous speed.
   (b) Explain the principle of operation of induction generator. [9+7]

6. (a) Explain why the magnetizing current in the transformer is non-sinusoidal even though the voltage applied to the primary is sinusoidal?

(b) A 3-phase, 3-winding, delta/delta/star, 33000/1100/400 V, 200 kVA transformer has a secondary load of 150 kVA at 0.8 pf lagging and a tertiary load of 50 kVA at 0.9 pf lagging. The magnetizing current is 4% of rated load, the iron loss being 1 kW. Calculate the value of the primary current when the other two windings are delivering the above loads. [8+8]

7. (a) Define efficiency and regulation of a transformer. Show how the power factor effects both of them.

   (b) The maximum efficiency of 50 KVA transformer is 97.4 % and occurs at 90 % of the full load. Calculate the efficiency of transformer at:

   i. Full load 0.8 power factor lagging
   ii. Half full load 0.9 power factor. [8+8]

8. (a) Draw and explain the phasor diagram of 3-phase induction motor.

   (b) Discuss the phenomenon of crawling and cogging in an induction motor.[8+8]

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Code No: NR220205 **NR** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
ELECTRO MECHANICS - 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 why the magnetizing current in the transformer is non-sinusoidal even though the voltage applied to the primary is sinusoidal?
   (b) A 3-phase, 3-winding, delta/delta/star, 33000/1100/400 V, 200 kVA transformer has a secondary load of 150 kVA at 0.8 pf lagging and a tertiary load of 50 kVA at 0.9 pf lagging. The magnetizing current is 4% of rated load, the iron loss being 1 kW. Calculate the value of the primary current when the other two windings are delivering the above loads. [8+8]

2. (a) What are the various methods to reduce the leakage flux in transformer.
   (b) Draw the phasor diagram of a single phase transformer with load having a leading power factor and explain. [7+9]

3. (a) Draw and explain the phasor diagram of 3-phase induction motor.
   (b) Discuss the phenomenon of crawling and cogging in an induction motor.[8+8]

4. (a) Define efficiency and regulation of a transformer. Show how the power factor effects both of them.
   (b) The maximum efficiency of 50 KVA transformer is 97.4 % and occurs at 90 % of the full load. Calculate the efficiency of transformer at:
      i. Full load 0.8 power factor lagging
      ii. Half full load 0.9 power factor. [8+8]

5. A 4KVA, 200/400V, 50Hz, single phase transformer gave the following test results: No-load : low voltage data, 200V, 0.7A, 60W., Short-circuit : High voltage data, 9V, 6A, 21.6W. Calculate:
   (a) The magnetizing current and the component corresponding to iron loss at normal voltage and frequency,
   (b) The efficiency on full load at unity power factor,
   (c) The secondary terminal voltage on full-load at power factors of unity, 0.8 lagging and 0.8 leading. [6+5+5]

6. (a) Sketch and discuss the typical torque-speed characteristics of an induction motor.
   (b) A 3-phase wound rotor induction motor develops a maximum torque of 4 times the full load torque at slip of 0.20. The per phase rotor resistance is 0.04Ω. The stator resistance and rotational losses are negligible. Calculate the value

of external resistance that must be inserted in the rotor circuit in order to minimize torque at starting. [8+8]

7. (a) Discuss the points of similarities between a transformer and an induction machine. Hence, explain why an induction machine is called a generalized transformer.

   (b) Explain why an induction motor, at noload, operates at a very low power factor. [8+8]

8. (a) Explain the method of emf injection for controlling speed of slip ring induction motor with the help of necessary diagrams and above and below the synchronous speed.

   (b) Explain the principle of operation of induction generator. [9+7]

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Code No: NR220205 **NR** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
ELECTRO MECHANICS - 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 the method of emf injection for controlling speed of slip ring induction motor with the help of necessary diagrams and above and below the synchronous speed.
   (b) Explain the principle of operation of induction generator. [9+7]
2. (a) Draw and explain the phasor diagram of 3-phase induction motor.
   (b) Discuss the phenomenon of crawling and cogging in an induction motor.[8+8]
3. (a) What are the various methods to reduce the leakage flux in transformer.
   (b) Draw the phasor diagram of a single phase transformer with load having a leading power factor and explain. [7+9]
4. (a) Explain why the magnetizing current in the transformer is non-sinusoidal even though the voltage applied to the primary is sinusoidal?
   (b) A 3-phase, 3-winding, delta/delta/star, 33000/1100/400 V, 200 kVA transformer has a secondary load of 150 kVA at 0.8 pf lagging and a tertiary load of 50 kVA at 0.9 pf lagging. The magnetizing current is 4% of rated load, the iron loss being 1 kW. Calculate the value of the primary current when the other two windings are delivering the above loads. [8+8]
5. A 4KVA, 200/400V, 50Hz, single phase transformer gave the following test results: No-load : low voltage data, 200V, 0.7A, 60W., Short-circuit : High voltage data, 9V, 6A, 21.6W. Calculate:
   (a) The magnetizing current and the component corresponding to iron loss at normal voltage and frequency,
   (b) The efficiency on full load at unity power factor,
   (c) The secondary terminal voltage on full-load at power factors of unity, 0.8 lagging and 0.8 leading. [6+5+5]
6. (a) Define efficiency and regulation of a transformer. Show how the power factor effects both of them.
   (b) The maximum efficiency of 50 KVA transformer is 97.4 % and occurs at 90 % of the full load. Calculate the efficiency of transformer at:
      i. Full load 0.8 power factor lagging
      ii. Half full load 0.9 power factor. [8+8]

7. (a) Sketch and discuss the typical torque-speed characteristics of an induction motor.

   (b) A 3-phase wound rotor induction motor develops a maximum torque of 4 times the full load torque at slip of 0.20. The per phase rotor resistance is 0.04Ω. The stator resistance and rotational losses are negligible. Calculate the value of external resistance that must be inserted in the rotor circuit in order to minimize torque at starting. [8+8]

8. (a) Discuss the points of similarities between a transformer and an induction machine. Hence, explain why an induction machine is called a generalized transformer.

   (b) Explain why an induction motor, at noload, operates at a very low power factor. [8+8]

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Code No: NR220205 **NR** **Set No. 3**

II B.Tech II Semester Examinations,December 2010
ELECTRO MECHANICS - 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 why the magnetizing current in the transformer is non-sinusoidal even though the voltage applied to the primary is sinusoidal?
   (b) A 3-phase, 3-winding, delta/delta/star, 33000/1100/400 V, 200 kVA transformer has a secondary load of 150 kVA at 0.8 pf lagging and a tertiary load of 50 kVA at 0.9 pf lagging. The magnetizing current is 4% of rated load, the iron loss being 1 kW. Calculate the value of the primary current when the other two windings are delivering the above loads. [8+8]

2. A 4KVA, 200/400V, 50Hz, single phase transformer gave the following test results: No-load : low voltage data, 200V, 0.7A, 60W., Short-circuit : High voltage data, 9V, 6A, 21.6W. Calculate:
   (a) The magnetizing current and the component corresponding to iron loss at normal voltage and frequency,
   (b) The efficiency on full load at unity power factor,
   (c) The secondary terminal voltage on full-load at power factors of unity, 0.8 lagging and 0.8 leading. [6+5+5]

3. (a) What are the various methods to reduce the leakage flux in transformer.
   (b) Draw the phasor diagram of a single phase transformer with load having a leading power factor and explain. [7+9]

4. (a) Draw and explain the phasor diagram of 3-phase induction motor.
   (b) Discuss the phenomenon of crawling and cogging in an induction motor.[8+8]

5. (a) Define efficiency and regulation of a transformer. Show how the power factor effects both of them.
   (b) The maximum efficiency of 50 KVA transformer is 97.4 % and occurs at 90 % of the full load. Calculate the efficiency of transformer at:
      i. Full load 0.8 power factor lagging
      ii. Half full load 0.9 power factor. [8+8]

6. (a) Discuss the points of similarities between a transformer and an induction machine. Hence, explain why an induction machine is called a generalized transformer.
   (b) Explain why an induction motor, at noload, operates at a very low power factor. [8+8]

7. (a) Explain the method of emf injection for controlling speed of slip ring induction motor with the help of necessary diagrams and above and below the synchronous speed.

   (b) Explain the principle of operation of induction generator. [9+7]

8. (a) Sketch and discuss the typical torque-speed characteristics of an induction motor.

   (b) A 3-phase wound rotor induction motor develops a maximum torque of 4 times the full load torque at slip of 0.20. The per phase rotor resistance is 0.04Ω. The stator resistance and rotational losses are negligible. Calculate the value of external resistance that must be inserted in the rotor circuit in order to minimize torque at starting. [8+8]

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