Code No: R05210302 **R05** **Set No. 2**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL ENGINEERING
Common to Mechanical Engineering, Chemical Engineering, Mechatronics, Production Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain with a neat sketch,the principle of operation of a D.C.motor.
   (b) A 4-pole series motor has 944 wave connected armature conductors. At a certain load the flux per pole is 34.6mwb and the total mechanical torque developed is 209N-m. Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of 500V. Given $R_a = 3\Omega$. [8+8]

2. (a) Determine the condition for maximum efficiency of a D.C generator.
   (b) A d. c. generator generates an e.m.f. of 520V. If has 2,000 armature conductors, flux per pole of 0.013 wb, speed of 1200 r.p.m and the armature winding has four parallel paths. Find the number of poles.
   (c) Calculate the flux in a 4-pole dynamo with 722 armature conductors generating 500V when running at 1000 r.p.m, when the armature is
      i. lap connected
      ii. wave connected. [4+4+8]

3. (a) Describe with neat sketches the constructional details of a salient pole type Alternator
   (b) Find the no-load phase and line voltage of a star-connected 3-phase, 6-pole alternator which runs at 1200 rpm, having flux per pole of 0.1 Wb sinusoidally distributed. Its stator has 54 slots having double layer winding. Each coil has 8 turns and the coil is chorded by one slot. [8+8]

4. (a) Define the following:
      i. Absolute instruments
      ii. Secondary instruments.
   (b) A PMMC instrument with an internal resistance of 730Ω has a full scale current of 5mA .It is to be converted into a multi range ammeter for ranges 1A, 5A, 25A and 125A using individual shunts for each range .Calculate the value of the individual shunts. [4+12]

5. (a) Explain why the rotor of poly phase induction motor can never attain synchronous speed.
   (b) A 3-Φ, 4-pole, 50Hz induction motor has a full-load speed of 1440 rpm. Calculate the following:

i. full-load slip and rotor frequency
ii. speed of stator field with respect to
   A. stator structure
   B. rotor structure
iii. speed of rotor field with respect to
   A. stator structure
   B. rotor structure. [6+10]

6. (a) Define self and mutual inductances. Establish the polarity of two mutually coupled coils on a single magnetic core.
   (b) Find the voltage needed across terminals a-b shown in the figure 6b so that the drop across the 10Ω resistor is 30V. Also find the corresponding voltage drop across the 5Ω resistor. [8+8]

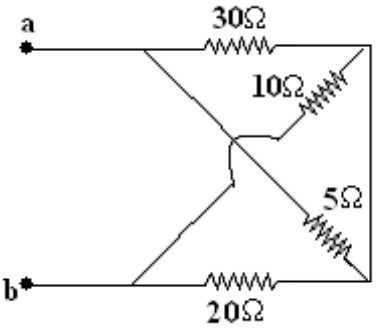

Figure 6b

7. (a) Derive the emf equation of a 1−Φ transformer and draw the no-load phasor diagram
   (b) A 1−Φ transformer has 360 turns on the primary and 180 turns on the secondary. The respective resistance are 0.233Ω aND 0.067Ω. Calculate the equivalent resistance of
   i. the primary in terms of secondary windings
   ii. the secondary in terms of primary windings
   iii. the total resistance of the transformer in terms of primary. [6+10]

8. (a) Define RMS value and Average Value of an alternating current..
   (b) For the circuit shown (figure8b), determine the true power, reactive power and apparent power in each branch. What is the power factor of the total circuit? [4+12]

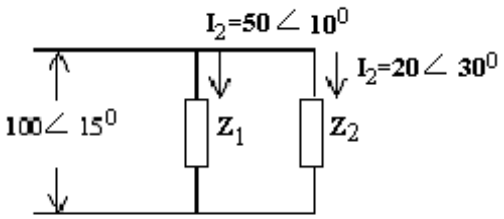

Figure 8b

Code No: R05210302 **R05** **Set No. 2**

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Code No: R05210302 **R05** **Set No. 4**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL ENGINEERING
Common to Mechanical Engineering, Chemical Engineering, Mechatronics, Production Engineering

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

Answer any FIVE Questions
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1. (a) Define self and mutual inductances. Establish the polarity of two mutually coupled coils on a single magnetic core.
   (b) Find the voltage needed across terminals a-b shown in the figure 1b so that the drop across the 10Ω resistor is 30V. Also find the corresponding voltage drop across the 5Ω resistor. [8+8]

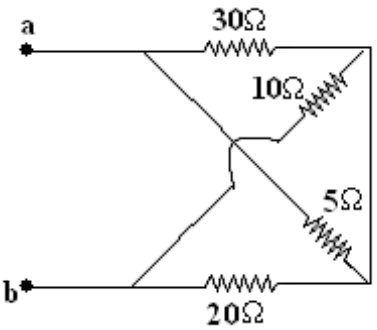

Figure 1b

2. (a) Explain why the rotor of poly phase induction motor can never attain synchronous speed.
   (b) A 3-Φ, 4-pole, 50Hz induction motor has a full-load speed of 1440 rpm. Calculate the following:
      i. full-load slip and rotor frequency
      ii. speed of stator field with respect to
         A. stator structure
         B. rotor structure
      iii. speed of rotor field with respect to
         A. stator structure
         B. rotor structure. [6+10]

3. (a) Determine the condition for maximum efficiency of a D.C generator.
   (b) A d. c. generator generates an e.m.f. of 520V. If has 2,000 armature conductors, flux per pole of 0.013 wb, speed of 1200 r.p.m and the armature winding has four parallel paths. Find the number of poles.
   (c) Calculate the flux in a 4-pole dynamo with 722 armature conductors generating 500V when running at 1000 r.p.m, when the armature is

i. lap connected
ii. wave connected. [4+4+8]

4. (a) Explain with a neat sketch,the principle of operation of a D.C.motor.
(b) A 4-pole series motor has 944 wave connected armature conductors. At a certain load the flux per pole is 34.6mwb and the total mechanical torque developed is 209N-m. Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of 500V. Given $R_a = 3\Omega$. [8+8]

5. (a) Derive the emf equation of a $1-\Phi$ transformer and draw the no-load phasor diagram
(b) A $1-\Phi$ transformer has 360 turns on the primary and 180 turns on the secondary. The respective resistance are 0.233Ω aND 0.067Ω. Calculate the equivalent resistance of
i. the primary in terms of secondary windings
ii. the secondary in terms of primary windings
iii. the total resistance of the transformer in terms of primary. [6+10]

6. (a) Define RMS value and Average Value of an alternating current..
(b) For the circuit shown (figure6b), determine the true power, reactive power and apparent power in each branch. What is the power factor of the total circuit? [4+12]

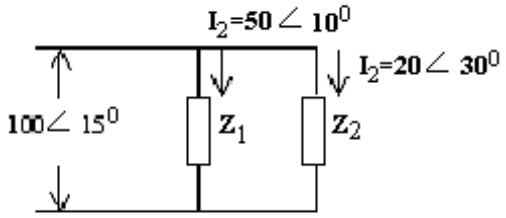

Figure 6b

7. (a) Define the following:
i. Absolute instruments
ii. Secondary instruments.
(b) A PMMC instrument with an internal resistance of 730Ω has a full scale current of 5mA .It is to be converted into a multi range ammeter for ranges 1A, 5A, 25A and 125A using individual shunts for each range .Calculate the value of the individual shunts. [4+12]

8. (a) Describe with neat sketches the constructional details of a salient pole type Alternator
(b) Find the no-load phase and line voltage of a star-connected 3-phase, 6-pole alternator which runs at 1200 rpm, having flux per pole of 0.1 Wb sinusoidally distributed. Its stator has 54 slots having double layer winding. Each coil has 8 turns and the coil is chorded by one slot. [8+8]

Code No: R05210302 **R05** **Set No. 4**

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Code No: R05210302 **R05** **Set No. 1**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL ENGINEERING
Common to Mechanical Engineering, Chemical Engineering, Mechatronics, Production Engineering

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

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   (b) A PMMC instrument with an internal resistance of 730Ω has a full scale current of 5mA .It is to be converted into a multi range ammeter for ranges 1A, 5A, 25A and 125A using individual shunts for each range .Calculate the value of the individual shunts. [4+12]

2. (a) Explain with a neat sketch,the principle of operation of a D.C.motor.
   (b) A 4-pole series motor has 944 wave connected armature conductors. At a certain load the flux per pole is 34.6mwb and the total mechanical torque developed is 209N-m. Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of 500V. Given R_a= 3Ω. [8+8]

3. (a) Define RMS value and Average Value of an alternating current..
   (b) For the circuit shown (figure3b), determine the true power, reactive power and apparent power in each branch. What is the power factor of the total circuit? [4+12]

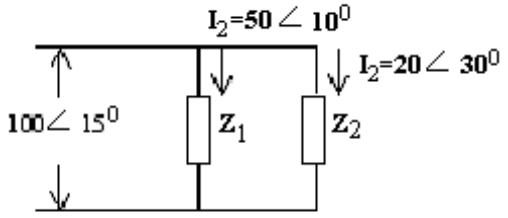

Figure 3b

4. (a) Derive the emf equation of a 1−Φ transformer and draw the no-load phasor diagram
   (b) A 1−Φ transformer has 360 turns on the primary and 180 turns on the secondary. The respective resistance are 0.233Ω aND 0.067Ω. Calculate the equivalent resistance of
   i. the primary in terms of secondary windings
   ii. the secondary in terms of primary windings

iii. the total resistance of the transformer in terms of primary. [6+10]

5. (a) Determine the condition for maximum efficiency of a D.C generator.
   (b) A d. c. generator generates an e.m.f. of 520V. If has 2,000 armature conductors, flux per pole of 0.013 wb, speed of 1200 r.p.m and the armature winding has four parallel paths. Find the number of poles.
   (c) Calculate the flux in a 4-pole dynamo with 722 armature conductors generating 500V when running at 1000 r.p.m, when the armature is
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   (b) A 3-Φ, 4-pole, 50Hz induction motor has a full-load speed of 1440 rpm. Calculate the following:
      i. full-load slip and rotor frequency
      ii. speed of stator field with respect to
         A. stator structure
         B. rotor structure
      iii. speed of rotor field with respect to
         A. stator structure
         B. rotor structure. [6+10]

7. (a) Define self and mutual inductances. Establish the polarity of two mutually coupled coils on a single magnetic core.
   (b) Find the voltage needed across terminals a-b shown in the figure 7b so that the drop across the 10Ω resistor is 30V. Also find the corresponding voltage drop across the 5Ω resistor. [8+8]

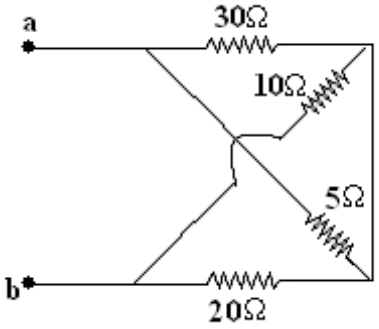

Figure 7b

8. (a) Describe with neat sketches the constructional details of a salient pole type Alternator
   (b) Find the no-load phase and line voltage of a star-connected 3-phase, 6-pole alternator which runs at 1200 rpm, having flux per pole of 0.1 Wb sinusoidally distributed. Its stator has 54 slots having double layer winding. Each coil has 8 turns and the coil is chorded by one slot. [8+8]

Code No: R05210302 **R05** **Set No. 1**

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Code No: R05210302 **R05** **Set No. 3**

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      i. the primary in terms of secondary windings
      ii. the secondary in terms of primary windings
      iii. the total resistance of the transformer in terms of primary. [6+10]
2. (a) Define self and mutual inductances. Establish the polarity of two mutually coupled coils on a single magnetic core.
   (b) Find the voltage needed across terminals a-b shown in the figure 2b so that the drop across the 10Ω resistor is 30V. Also find the corresponding voltage drop across the 5Ω resistor. [8+8]

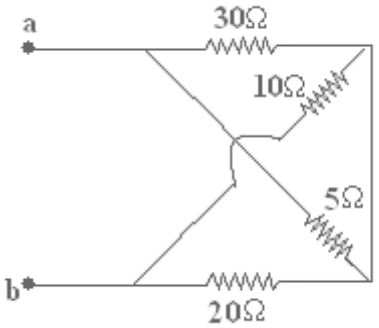

Figure 2b

3. (a) Explain why the rotor of poly phase induction motor can never attain synchronous speed.
   (b) A 3-Φ, 4-pole, 50Hz induction motor has a full-load speed of 1440 rpm. Calculate the following:
      i. full-load slip and rotor frequency
      ii. speed of stator field with respect to
         A. stator structure
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      iii. speed of rotor field with respect to

A. stator structure
B. rotor structure. [6+10]

4. (a) Define RMS value and Average Value of an alternating current..
   (b) For the circuit shown (figure4b), determine the true power, reactive power and apparent power in each branch. What is the power factor of the total circuit? [4+12]

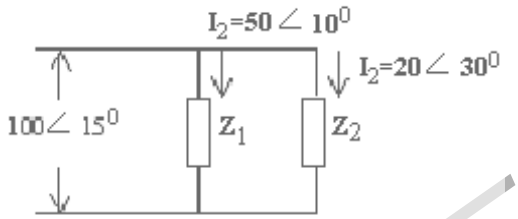

Figure 4b

5. (a) Describe with neat sketches the constructional details of a salient pole type Alternator
   (b) Find the no-load phase and line voltage of a star-connected 3-phase, 6-pole alternator which runs at 1200 rpm, having flux per pole of 0.1 Wb sinusoidally distributed. Its stator has 54 slots having double layer winding. Each coil has 8 turns and the coil is chorded by one slot. [8+8]

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Code No: R05210302 **R05** **Set No. 3**

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