Code No: R05210206 **R05** **Set No. 2**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL MACHINES-I
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) Define torque. Derive the expression for torque developed by a D.C. motor from fundamentals.
   (b) Determine the torque developed when a current of 30A passes through the armature of a motor with the following particulars: lap winding, 310 conductors, 4-pole, pole-shoes 16.2 cm long subtending an angle of 60^0 at the centre, bore radius 16.2 cm, flux density in air gap 0.7 tesla. [8+8]

2. (a) Distinguish between internal and external characteristic of a DC generator. How can the internal characteristic be derived from the external characteristic of a separately excited generator.
   (b) A separately excited generator with constant excitation is connected to a constant load. When the speed is 1500 rpm, it delivers 120A at 500V. At what speed will the current be reduced to 60A? Armature resistance is 0.1 ohm, Contact drop/brush is 1V. Armature reaction may be ignored. [8+8]

3. (a) With neat figures explain energy and coenergy.
   (b) The $\lambda-$ i relation ship for an electromechanical system is given by $\lambda = 3.5i^{1/3}/l_g$,,where l_g is length of air gap. Determine the mechanical force on moving part if the current in the exciting coil is 11 Amp and and $l_g = 1$ mm. [8+8]

4. (a) Explain the differences between lap and wave winding. Explain the limitations of each winding.
   (b) A DC generator is operating at a voltage of 220 V and supplying power to a load having resistance of 1.1 ohm. Find the EMF induced if armature resistance is 28 milliohm and total brush voltage drop is 1 Volt. Also find the total conductors required to obtain the rated voltage, if armature is wound with wave winding and flux per pole is 40 mwb, With 4 poles and rotating at 700 RPM. [8+8]

5. (a) Can we conduct Swinburne's test on DC series motor. Explain the reason.
   (b) A field test on two mechanically coupled similar DC series motors (with their field winding connected in series) gave the following data:
   Motor: Armature current = 50 A; Armature voltage = 500 V; drop across field winding = 38 V Generator: Armature current = 38 A; Armature voltage = 400 V; drop across field winding = 36 V. resistance of each armature is 0.2 Ω. calculate the efficiency of each machine at this load. [6+10]

6. What is critical speed? How do you calculate the critical speed in laboratory. [16]

7. (a) Define commutation. Write about resistance commutation.

   (b) What is the significance of compensating winding? Derive the expression for no. of armature ampere turns per pole for compensating value. [8+8]

8. (a) A 220 V DC shunt motor, with an armature resistance of 0.1 Ω is running at 1000 RPM and takes an armature current of 50 A. If the field flux is suddenly reduced by 10%, obtain
      i. the maximum value of current at this instant and the corresponding torque.
      ii. Ultimate speed and armature current after the transients are over. Assume constant load.

   (b) Explain the use of diverters in speed control of DC series motors. [10+6]

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Code No: R05210206 **R05** **Set No. 4**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL MACHINES-I
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) A 220 V DC shunt motor, with an armature resistance of 0.1 Ω is running at 1000 RPM and takes an armature current of 50 A. If the field flux is suddenly reduced by 10%, obtain
   i. the maximum value of current at this instant and the corresponding torque.
   ii. Ultimate speed and armature current after the transients are over. Assume constant load.
   (b) Explain the use of diverters in speed control of DC series motors. [10+6]
2. (a) Define torque. Derive the expression for torque developed by a D.C. motor from fundamentals.
   (b) Determine the torque developed when a current of 30A passes through the armature of a motor with the following particulars: lap winding, 310 conductors, 4-pole, pole-shoes 16.2 cm long subtending an angle of 60^0 at the centre, bore radius 16.2 cm, flux density in air gap 0.7 tesla. [8+8]
3. (a) Define commutation. Write about resistance commutation.
   (b) What is the significance of compensating winding? Derive the expression for no. of armature ampere turns per pole for compensating value. [8+8]
4. (a) Distinguish between internal and external characteristic of a DC generator. How can the internal characteristic be derived from the external characteristic of a separately excited generator.
   (b) A separately excited generator with constant excitation is connected to a constant load. When the speed is 1500 rpm, it delivers 120A at 500V. At what speed will the current be reduced to 60A? Armature resistance is 0.1 ohm, Contact drop/brush is 1V. Armature reaction may be ignored. [8+8]
5. (a) Can we conduct Swinburne's test on DC series motor. Explain the reason.
   (b) A field test on two mechanically coupled similar DC series motors (with their field winding connected in series) gave the following data:
   Motor: Armature current = 50 A; Armature voltage = 500 V; drop across field winding = 38 V Generator: Armature current = 38 A; Armature voltage = 400 V; drop across field winding = 36 V. resistance of each armature is 0.2 Ω. calculate the efficiency of each machine at this load. [6+10]

6. (a) Explain the differences between lap and wave winding. Explain the limitations of each winding.

   (b) A DC generator is operating at a voltage of 220 V and supplying power to a load having resistance of 1.1 ohm. Find the EMF induced if armature resistance is 28 milliohm and total brush voltage drop is 1 Volt. Also find the total conductors required to obtain the rated voltage, if armature is wound with wave winding and flux per pole is 40 mwb, With 4 poles and rotating at 700 RPM. [8+8]

7. (a) With neat figures explain energy and coenergy.

   (b) The $\lambda-$i relation ship for an electromechanical system is given by $\lambda = 3.5i^{1/3}/l_g$,,where l_g is length of air gap. Determine the mechanical force on moving part if the current in the exciting coil is 11 Amp and and $l_g = 1$ mm. [8+8]

8. What is critical speed? How do you calculate the critical speed in laboratory. [16]

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Code No: R05210206 **R05** **Set No. 1**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL MACHINES-I
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) With neat figures explain energy and coenergy.
   (b) The $\lambda-$i relation ship for an electromechanical system is given by $\lambda= 3.5i^{1/3}/l_g$,,where l_g is length of air gap. Determine the mechanical force on moving part if the current in the exciting coil is 11 Amp and and $l_g = 1$ mm. [8+8]
2. (a) Explain the differences between lap and wave winding. Explain the limitations of each winding.
   (b) A DC generator is operating at a voltage of 220 V and supplying power to a load having resistance of 1.1 ohm. Find the EMF induced if armature resistance is 28 milliohm and total brush voltage drop is 1 Volt. Also find the total conductors required to obtain the rated voltage, if armature is wound with wave winding and flux per pole is 40 mwb, With 4 poles and rotating at 700 RPM. [8+8]
3. What is critical speed? How do you calculate the critical speed in laboratory. [16]
4. (a) Define torque. Derive the expression for torque developed by a D.C. motor from fundamentals.
   (b) Determine the torque developed when a current of 30A passes through the armature of a motor with the following particulars: lap winding, 310 conductors, 4-pole, pole-shoes 16.2 cm long subtending an angle of 60^0 at the centre, bore radius 16.2 cm, flux density in air gap 0.7 tesla. [8+8]
5. (a) Define commutation. Write about resistance commutation.
   (b) What is the significance of compensating winding? Derive the expression for no. of armature ampere turns per pole for compensating value. [8+8]
6. (a) A 220 V DC shunt motor, with an armature resistance of 0.1 Ω is running at 1000 RPM and takes an armature current of 50 A. If the field flux is suddenly reduced by 10%, obtain
      i. the maximum value of current at this instant and the corresponding torque.
      ii. Ultimate speed and armature current after the transients are over. Assume constant load.
   (b) Explain the use of diverters in speed control of DC series motors. [10+6]
7. (a) Can we conduct Swinburne's test on DC series motor. Explain the reason.

(b) A field test on two mechanically coupled similar DC series motors (with their field winding connected in series) gave the following data:
Motor: Armature current = 50 A; Armature voltage = 500 V; drop across field winding = 38 V Generator: Armature current = 38 A; Armature voltage = 400 V; drop across field winding = 36 V. resistance of each armature is 0.2 Ω. calculate the efficiency of each machine at this load. [6+10]

8. (a) Distinguish between internal and external characteristic of a DC generator. How can the internal characteristic be derived from the external characteristic of a separately excited generator.

(b) A separately excited generator with constant excitation is connected to a constant load. When the speed is 1500 rpm, it delivers 120A at 500V. At what speed will the current be reduced to 60A? Armature resistance is 0.1 ohm, Contact drop/brush is 1V. Armature reaction may be ignored. [8+8]

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Code No: R05210206 **R05** **Set No. 3**

II B.Tech I Semester Examinations,November 2010
ELECTRICAL MACHINES-I
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) With neat figures explain energy and coenergy.
   (b) The $\lambda-$i relation ship for an electromechanical system is given by $\lambda = 3.5i^{1/3}/l_g$,,where l_g is length of air gap. Determine the mechanical force on moving part if the current in the exciting coil is 11 Amp and and $l_g = 1$ mm. [8+8]

2. (a) Define commutation. Write about resistance commutation.
   (b) What is the significance of compensating winding? Derive the expression for no. of armature ampere turns per pole for compensating value. [8+8]

3. (a) Distinguish between internal and external characteristic of a DC generator. How can the internal characteristic be derived from the external characteristic of a separately excited generator.
   (b) A separately excited generator with constant excitation is connected to a constant load. When the speed is 1500 rpm, it delivers 120A at 500V. At what speed will the current be reduced to 60A? Armature resistance is 0.1 ohm, Contact drop/brush is 1V. Armature reaction may be ignored. [8+8]

4. (a) A 220 V DC shunt motor, with an armature resistance of 0.1 Ω is running at 1000 RPM and takes an armature current of 50 A. If the field flux is suddenly reduced by 10%, obtain
      i. the maximum value of current at this instant and the corresponding torque.
      ii. Ultimate speed and armature current after the transients are over. Assume constant load.
   (b) Explain the use of diverters in speed control of DC series motors. [10+6]

5. (a) Explain the differences between lap and wave winding. Explain the limitations of each winding.
   (b) A DC generator is operating at a voltage of 220 V and supplying power to a load having resistance of 1.1 ohm. Find the EMF induced if armature resistance is 28 milliohm and total brush voltage drop is 1 Volt. Also find the total conductors required to obtain the rated voltage, if armature is wound with wave winding and flux per pole is 40 mwb, With 4 poles and rotating at 700 RPM. [8+8]

6. (a) Can we conduct Swinburne's test on DC series motor. Explain the reason.

(b) A field test on two mechanically coupled similar DC series motors (with their field winding connected in series) gave the following data:
Motor: Armature current = 50 A; Armature voltage = 500 V; drop across field winding = 38 V Generator: Armature current = 38 A; Armature voltage = 400 V; drop across field winding = 36 V. resistance of each armature is 0.2 Ω. calculate the efficiency of each machine at this load. [6+10]

7. What is critical speed? How do you calculate the critical speed in laboratory. [16]

8. (a) Define torque. Derive the expression for torque developed by a D.C. motor from fundamentals.

(b) Determine the torque developed when a current of 30A passes through the armature of a motor with the following particulars: lap winding, 310 conductors, 4-pole, pole-shoes 16.2 cm long subtending an angle of 60^0 at the centre, bore radius 16.2 cm, flux density in air gap 0.7 tesla. [8+8]

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