Code No: 07A30201 **R07** **Set No. 2**

II B.Tech I Semester Examinations,MAY 2011
ELECTRICAL MACHINES - I
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What is the principle of operation of a dc generator? Why is a commutator and brush arrangement necessary for the operation of a dc generator?
   (b) A 4 pole dc armature winding having 40 slots and 120 coils is to be provided with a simplex lap winding. Work out with a suitable arrangement so that split winding is not used. [8+8]

2. A 10kW 900 rpm, 400V dc shunt motor has armature circuit resistance (including brushes) of 1Ω and shunt field resistance of 400Ω. If efficiency at rated load is 85%, then calculate:
   (a) The no-laoad armature current,
   (b) The speed when motor draws 20A from the mains and
   (c) The armature current when the total(or internal) torque developed is 98.5 Nm.
   Assume the flux and remain constant. [16]

3. A shunt motor fed from a 400 V direct current supply takes an armature current of 100 A when running at 800 rpm. If the total torque developed remains unchanged, find the speed at which the motor will run if the flux is increased to 120% of its original value and a resistance of 0.8 ohm is connected in series with the armature. The armature resistance is 0.2 ohm. [16]

4. Two 220 V d.c. generators operate in parallel. One machine has a terminal voltage of 270 V on no-load and 220 V at al load current of 35 A. The other has a voltage of 280 V on no-load and 220 V at 50 A. The external characteristics are linear. Calculate the bus-bars voltage and the output current of each machine when the total load is:
   (a) 60 A
   (b) 20 A. [16]

5. (a) Explain in detail how a dc shunt generator builds up its voltage. What limits the voltage to which can build up?
   (b) A series generator delivers 100A at 250V and the resistance of the series field and armature resistance are 0.055 Ω and 0.1 Ω respectively. Calculate the armature current and generated emf. [8+8]

6. A shunt wound motor has a field resistance of 400 Ω and an armature resistance of 0.1 Ω and runs off 240V supply. The armature current is 60A and the motor speed is 900 rpm. Assuming a straight line magnetization curve calculate
   (a) the additional resistance in the field to increase the speed to 1000 rpm for the same armature current
   (b) the speed with which the original field current of 200A. [8+8]
7. (a) Explain the principle of energy conversion of electromechanical system.
   (b) Derive an expression for the energy stored in a magnetic field. [8+8]
8. (a) Explain the following methods of improving commutation
      i. Resistance commutation
      ii. E.M.F commutation
   (b) A 75kw, 4-pole wave wound dc generator has 72 armature conductors. The brushes are given an actual lead of 9^0 at full load. Calculate
      i. Cross magnetizing AT/pole
      ii. Demagnetizing AT/pole and
      iii. Series turns required to neutralize the demagnetizing effect. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: 07A30201 **R07** **Set No. 4**

II B.Tech I Semester Examinations,MAY 2011
ELECTRICAL MACHINES - I
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. A shunt motor fed from a 400 V direct current supply takes an armature current of 100 A when running at 800 rpm. If the total torque developed remains unchanged, find the speed at which the motor will run if the flux is increased to 120% of its original value and a resistance of 0.8 ohm is connected in series with the armature. The armature resistance is 0.2 ohm. [16]

2. Two 220 V d.c. generators operate in parallel. One machine has a terminal voltage of 270 V on no-load and 220 V at al load current of 35 A. The other has a voltage of 280 V on no-load and 220 V at 50 A. The external characteristics are linear. Calculate the bus-bars voltage and the output current of each machine when the total load is:
   (a) 60 A
   (b) 20 A. [16]

3. A 10kW 900 rpm, 400V dc shunt motor has armature circuit resistance (including brushes) of 1Ω and shunt field resistance of 400Ω. If efficiency at rated load is 85%, then calculate:
   (a) The no-laoad armature current,
   (b) The speed when motor draws 20A from the mains and
   (c) The armature current when the total(or internal) torque developed is 98.5 Nm.
   Assume the flux and remain constant. [16]

4. (a) What is the principle of operation of a dc generator? Why is a commutator and brush arrangement necessary for the operation of a dc generator?
   (b) A 4 pole dc armature winding having 40 slots and 120 coils is to be provided with a simplex lap winding. Work out with a suitable arrangement so that split winding is not used. [8+8]

5. (a) Explain in detail how a dc shunt generator builds up its voltage. What limits the voltage to which can build up?
   (b) A series generator delivers 100A at 250V and the resistance of the series field and armature resistance are 0.055 Ω and 0.1 Ω respectively. Calculate the armature current and generated emf. [8+8]

6. A shunt wound motor has a field resistance of 400 Ω and an armature resistance of 0.1 Ω and runs off 240V supply. The armature current is 60A and the motor speed is 900 rpm. Assuming a straight line magnetization curve calculate
   (a) the additional resistance in the field to increase the speed to 1000 rpm for the same armature current
   (b) the speed with which the original field current of 200A. [8+8]

7. (a) Explain the following methods of improving commutation
      i. Resistance commutation
      ii. E.M.F commutation
   (b) A 75kw, 4-pole wave wound dc generator has 72 armature conductors. The brushes are given an actual lead of 9^0 at full load. Calculate
      i. Cross magnetizing AT/pole
      ii. Demagnetizing AT/pole and
      iii. Series turns required to neutralize the demagnetizing effect. [8+8]

8. (a) Explain the principle of energy conversion of electromechanical system.
   (b) Derive an expression for the energy stored in a magnetic field. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: 07A30201 **R07** **Set No. 1**

II B.Tech I Semester Examinations,MAY 2011
ELECTRICAL MACHINES - I
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. A shunt wound motor has a field resistance of 400 Ω and an armature resistance of 0.1 Ω and runs off 240V supply. The armature current is 60A and the motor speed is 900 rpm. Assuming a straight line magnetization curve calculate
   (a) the additional resistance in the field to increase the speed to 1000 rpm for the same armature current
   (b) the speed with which the original field current of 200A. [8+8]

2. (a) Explain in detail how a dc shunt generator builds up its voltage. What limits the voltage to which can build up?
   (b) A series generator delivers 100A at 250V and the resistance of the series field and armature resistance are 0.055 Ω and 0.1 Ω respectively. Calculate the armature current and generated emf. [8+8]

3. A shunt motor fed from a 400 V direct current supply takes an armature current of 100 A when running at 800 rpm. If the total torque developed remains unchanged, find the speed at which the motor will run if the flux is increased to 120% of its original value and a resistance of 0.8 ohm is connected in series with the armature. The armature resistance is 0.2 ohm. [16]

4. Two 220 V d.c. generators operate in parallel. One machine has a terminal voltage of 270 V on no-load and 220 V at al load current of 35 A. The other has a voltage of 280 V on no-load and 220 V at 50 A. The external characteristics are linear. Calculate the bus-bars voltage and the output current of each machine when the total load is:
   (a) 60 A
   (b) 20 A. [16]

5. (a) What is the principle of operation of a dc generator? Why is a commutator and brush arrangement necessary for the operation of a dc generator?
   (b) A 4 pole dc armature winding having 40 slots and 120 coils is to be provided with a simplex lap winding. Work out with a suitable arrangement so that split winding is not used. [8+8]

6. (a) Explain the principle of energy conversion of electromechanical system.
   (b) Derive an expression for the energy stored in a magnetic field. [8+8]

7. A 10kW 900 rpm, 400V dc shunt motor has armature circuit resistance (including brushes) of 1Ω and shunt field resistance of 400Ω. If efficiency at rated load is 85%, then calculate:
   (a) The no-laoad armature current,
   (b) The speed when motor draws 20A from the mains and
   (c) The armature current when the total(or internal) torque developed is 98.5 Nm.
   Assume the flux and remain constant. [16]

8. (a) Explain the following methods of improving commutation
      i. Resistance commutation
      ii. E.M.F commutation
   (b) A 75kw, 4-pole wave wound dc generator has 72 armature conductors. The brushes are given an actual lead of 9^0 at full load. Calculate
      i. Cross magnetizing AT/pole
      ii. Demagnetizing AT/pole and
      iii. Series turns required to neutralize the demagnetizing effect. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: 07A30201 **R07** **Set No. 3**

II B.Tech I Semester Examinations,MAY 2011
ELECTRICAL MACHINES - I
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. A shunt motor fed from a 400 V direct current supply takes an armature current of 100 A when running at 800 rpm. If the total torque developed remains unchanged, find the speed at which the motor will run if the flux is increased to 120% of its original value and a resistance of 0.8 ohm is connected in series with the armature. The armature resistance is 0.2 ohm. [16]

2. (a) What is the principle of operation of a dc generator? Why is a commutator and brush arrangement necessary for the operation of a dc generator?
   (b) A 4 pole dc armature winding having 40 slots and 120 coils is to be provided with a simplex lap winding. Work out with a suitable arrangement so that split winding is not used. [8+8]

3. A shunt wound motor has a field resistance of 400 Ω and an armature resistance of 0.1 Ω and runs off 240V supply. The armature current is 60A and the motor speed is 900 rpm. Assuming a straight line magnetization curve calculate
   (a) the additional resistance in the field to increase the speed to 1000 rpm for the same armature current
   (b) the speed with which the original field current of 200A. [8+8]

4. (a) Explain the following methods of improving commutation
      i. Resistance commutation
      ii. E.M.F commutation
   (b) A 75kw, 4-pole wave wound dc generator has 72 armature conductors. The brushes are given an actual lead of 9^0 at full load. Calculate
      i. Cross magnetizing AT/pole
      ii. Demagnetizing AT/pole and
      iii. Series turns required to neutralize the demagnetizing effect. [8+8]

5. (a) Explain the principle of energy conversion of electromechanical system.
   (b) Derive an expression for the energy stored in a magnetic field. [8+8]

6. (a) Explain in detail how a dc shunt generator builds up its voltage. What limits the voltage to which can build up?
   (b) A series generator delivers 100A at 250V and the resistance of the series field and armature resistance are 0.055 Ω and 0.1 Ω respectively. Calculate the armature current and generated emf. [8+8]

7. Two 220 V d.c. generators operate in parallel. One machine has a terminal voltage of 270 V on no-load and 220 V at al load current of 35 A. The other has a voltage of 280 V on no-load and 220 V at 50 A. The external characteristics are linear. Calculate the bus-bars voltage and the output current of each machine when the total load is:

   (a) 60 A

   (b) 20 A. [16]

8. A 10kW 900 rpm, 400V dc shunt motor has armature circuit resistance (including brushes) of 1Ω and shunt field resistance of 400Ω. If efficiency at rated load is 85%, then calculate:

   (a) The no-laoad armature current,

   (b) The speed when motor draws 20A from the mains and

   (c) The armature current when the total(or internal) torque developed is 98.5 Nm.
   Assume the flux and remain constant. [16]

⋆ ⋆ ⋆ ⋆ ⋆