Code No: NR220402   **NR**   **Set No. 2**

II B.Tech II Semester Examinations,December 2010
ELECTRICAL TECHNOLOGY
Common to IT, E.COMP.E, ETM, CSE, ECE, CSSE

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 34.6 mWb and the total mechanical torque developed is 209 Nm. Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of 500V. Total armature resistance is 3Ω.   [8+8]

2. (a) Define slip. Hence deduce the expression for
     i. Frequency of rotor current
     ii. Rotor induced e.m.f under running condition of a 3-phase induction motor.
   (b) A 60 kW, 400 V, 3-phase, 6-pole, 50 Hz wound rotor induction motor has a full-load slip of 0.04 when operating at rated voltage and frequency with rotor winding short circuited at slip rings. The slip at maximum torque is 0.2. Stator resistance and rotational losses are neglected. Determine   [8+8]
     i. the maximum torque and
     ii. full-load rotor ohmic losses. Rotor resistance is now doubled by adding external series resistance in each rotor phase. For the rated power output, determine
     iii. slip at maximum torque
     iv. full-load slip and
     v. full-load torque.

3. (a) Draw and explain typical no-load & load characteristics of a D.C. Series Generator.
   (b) A shunt generator has following magnetizing curve:

If(amps)	0	0.5	1.0	1.5	2.0
E(Volts)	4	42	78	93	100

   Calculate the value of critical field resistance. Also find the value of open-circuit voltage when field resistance is 60 ohms.   [8+8]

4. (a) Explain neatly the constructional features of an alternator.
   (b) 3 ph, 10-pole alternator has 2 slots per pole per phase on its stator with 10 conductors per slot. The air gap flux is distributed sinusoidally and equals to 0.005wb.The stator has a double layer winding with a coil span of 150 electrical degrees. If the alternator is running at 600r.p.m, Calculate the e.m.f generated per phase at no load.   [8+8]

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5. Discuss the constructional details of single-phase transformer and hence obtain the expression for induced e. m. f. of transformer. [16]

6. (a) A 500V, 50 Hz, Single-phase synchronous motor takes 50A current at a power factor of 0.8 lagging. The motor has a synchronous reactance of 20ohm and negligible resistance. The armature has 120 full pitch coils in series, with a distribution factor of 0.95. Assuming a sinusoidal variation of flux in the air gap. Calculate the flux per pole.

   (b) Derive expressions for distribution factor and pitch factor. [8+8]

7. (a) Discuss the function of an a.c.tacho.meter. Explain its construction and operations.

   (b) What are the applications of stepper motor and synchros? [10+6]

8. (a) Define regulation. Obtain the condition for zero regulation of a transformer.

   (b) In a 20kVA, 2000/200V transformer the iron and copper losses are 300 W and 400W respectively. Calculate the efficiency on 0.8 power factor at [6+10]

   i. full load and

   ii. 60% of full load

   iii. Determine the load for maximum efficiency and the iron and copper loss in this case.

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Code No: NR220402   **NR**   **Set No. 4**

II B.Tech II Semester Examinations,December 2010
ELECTRICAL TECHNOLOGY
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Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Define slip. Hence deduce the expression for

     i. Frequency of rotor current

     ii. Rotor induced e.m.f under running condition of a 3-phase induction motor.

   (b) A 60 kW, 400 V, 3-phase, 6-pole, 50 Hz wound rotor induction motor has a full-load slip of 0.04 when operating at rated voltage and frequency with rotor winding short circuited at slip rings. The slip at maximum torque is 0.2. Stator resistance and rotational losses are neglected. Determine   [8+8]

     i. the maximum torque and

     ii. full-load rotor ohmic losses. Rotor resistance is now doubled by adding external series resistance in each rotor phase. For the rated power output, determine

     iii. slip at maximum torque

     iv. full-load slip and

     v. full-load torque.

2. (a) Draw and explain typical no-load & load characteristics of a D.C. Series Generator.

   (b) A shunt generator has following magnetizing curve:

If(amps)	0	0.5	1.0	1.5	2.0
E(Volts)	4	42	78	93	100

     Calculate the value of critical field resistance. Also find the value of open-circuit voltage when field resistance is 60 ohms.   [8+8]

3. (a) Define regulation. Obtain the condition for zero regulation of a transformer.

   (b) In a 20kVA, 2000/200V transformer the iron and copper losses are 300 W and 400W respectively. Calculate the efficiency on 0.8 power factor at   [6+10]

     i. full load and

     ii. 60% of full load

     iii. Determine the load for maximum efficiency and the iron and copper loss in this case.

4. (a) Explain neatly the constructional features of an alternator.

(b) 3 ph, 10-pole alternator has 2 slots per pole per phase on its stator with 10 conductors per slot. The air gap flux is distributed sinusoidally and equals to 0.005wb.The stator has a double layer winding with a coil span of 150 electrical degrees. If the alternator is running at 600r.p.m, Calculate the e.m.f generated per phase at no load. [8+8]

5. (a) A 500V, 50 Hz, Single-phase synchronous motor takes 50A current at a power factor of 0.8 lagging. The motor has a synchronous reactance of 20ohm and negligible resistance. The armature has 120 full pitch coils in series, with a distribution factor of 0.95. Assuming a sinusoidal variation of flux in the air gap. Calculate the flux per pole.

   (b) Derive expressions for distribution factor and pitch factor. [8+8]

6. (a) Discuss the function of an a.c.tacho.meter. Explain its construction and operations.

   (b) What are the applications of stepper motor and synchros? [10+6]

7. Discuss the constructional details of single-phase transformer and hence obtain the expression for induced e. m. f. of transformer. [16]

8. (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 34.6 mWb and the total mechanical torque developed is 209 Nm. Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of 500V. Total armature resistance is 3Ω. [8+8]

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NR **Set No. 1**

II B.Tech II Semester Examinations,December 2010
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Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Discuss the function of an a.c.tacho.meter. Explain its construction and operations.

   (b) What are the applications of stepper motor and synchros? [10+6]

2. (a) Explain neatly the constructional features of an alternator.

   (b) 3 ph, 10-pole alternator has 2 slots per pole per phase on its stator with 10 conductors per slot. The air gap flux is distributed sinusoidally and equals to 0.005wb.The stator has a double layer winding with a coil span of 150 electrical degrees. If the alternator is running at 600r.p.m, Calculate the e.m.f generated per phase at no load. [8+8]

3. (a) Define slip. Hence deduce the expression for

      i. Frequency of rotor current
      ii. Rotor induced e.m.f under running condition of a 3-phase induction motor.

   (b) A 60 kW, 400 V, 3-phase, 6-pole, 50 Hz wound rotor induction motor has a full-load slip of 0.04 when operating at rated voltage and frequency with rotor winding short circuited at slip rings. The slip at maximum torque is 0.2. Stator resistance and rotational losses are neglected. Determine [8+8]

      i. the maximum torque and
      ii. full-load rotor ohmic losses. Rotor resistance is now doubled by adding external series resistance in each rotor phase. For the rated power output, determine
      iii. slip at maximum torque
      iv. full-load slip and
      v. full-load torque.

4. (a) A 500V, 50 Hz, Single-phase synchronous motor takes 50A current at a power factor of 0.8 lagging. The motor has a synchronous reactance of 20ohm and negligible resistance. The armature has 120 full pitch coils in series, with a distribution factor of 0.95. Assuming a sinusoidal variation of flux in the air gap. Calculate the flux per pole.

   (b) Derive expressions for distribution factor and pitch factor. [8+8]

5. (a) Define regulation. Obtain the condition for zero regulation of a transformer.

   (b) In a 20kVA, 2000/200V transformer the iron and copper losses are 300 W and 400W respectively. Calculate the efficiency on 0.8 power factor at [6+10]

5

      i. full load and

      ii. 60% of full load

      iii. Determine the load for maximum efficiency and the iron and copper loss in this case.

6. (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 34.6 mWb and the total mechanical torque developed is 209 Nm. Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of 500V. Total armature resistance is 3Ω. [8+8]

7. Discuss the constructional details of single-phase transformer and hence obtain the expression for induced e. m. f. of transformer. [16]

8. (a) Draw and explain typical no-load & load characteristics of a D.C. Series Generator.

   (b) A shunt generator has following magnetizing curve:

If(amps)	0	0.5	1.0	1.5	2.0
E(Volts)	4	42	78	93	100

Calculate the value of critical field resistance. Also find the value of open-circuit voltage when field resistance is 60 ohms. [8+8]

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Code No: **NR220402**　　　　　**NR**　　　　　**Set No. 3**

II B.Tech II Semester Examinations,December 2010
ELECTRICAL TECHNOLOGY
Common to IT, E.COMP.E, ETM, CSE, ECE, CSSE

Time: 3 hours　　　　　　　　　　　　　　　　　Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Define regulation. Obtain the condition for zero regulation of a transformer.

   (b) In a 20kVA, 2000/200V transformer the iron and copper losses are 300 W and 400W respectively. Calculate the efficiency on 0.8 power factor at　　[6+10]

      i. full load and

      ii. 60% of full load

      iii. Determine the load for maximum efficiency and the iron and copper loss in this case.

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 34.6 mWb and the total mechanical torque developed is 209 Nm. Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of 500V. Total armature resistance is 3Ω.　　[8+8]

3. (a) Draw and explain typical no-load & load characteristics of a D.C. Series Generator.

   (b) A shunt generator has following magnetizing curve:

If(amps)	0	0.5	1.0	1.5	2.0
E(Volts)	4	42	78	93	100

      Calculate the value of critical field resistance. Also find the value of open-circuit voltage when field resistance is 60 ohms.　　[8+8]

4. (a) Define slip. Hence deduce the expression for

      i. Frequency of rotor current

      ii. Rotor induced e.m.f under running condition of a 3-phase induction motor.

   (b) A 60 kW, 400 V, 3-phase, 6-pole, 50 Hz wound rotor induction motor has a full-load slip of 0.04 when operating at rated voltage and frequency with rotor winding short circuited at slip rings. The slip at maximum torque is 0.2. Stator resistance and rotational losses are neglected. Determine　　[8+8]

      i. the maximum torque and

      ii. full-load rotor ohmic losses. Rotor resistance is now doubled by adding external series resistance in each rotor phase. For the rated power output, determine

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       iii. slip at maximum torque

       iv. full-load slip and

       v. full-load torque.

5. Discuss the constructional details of single-phase transformer and hence obtain the expression for induced e. m. f. of transformer. [16]

6. (a) Discuss the function of an a.c.tacho.meter. Explain its construction and operations.

   (b) What are the applications of stepper motor and synchros? [10+6]

7. (a) Explain neatly the constructional features of an alternator.

   (b) 3 ph, 10-pole alternator has 2 slots per pole per phase on its stator with 10 conductors per slot. The air gap flux is distributed sinusoidally and equals to 0.005wb.The stator has a double layer winding with a coil span of 150 electrical degrees. If the alternator is running at 600r.p.m, Calculate the e.m.f generated per phase at no load. [8+8]

8. (a) A 500V, 50 Hz, Single-phase synchronous motor takes 50A current at a power factor of 0.8 lagging. The motor has a synchronous reactance of 20ohm and negligible resistance. The armature has 120 full pitch coils in series, with a distribution factor of 0.95. Assuming a sinusoidal variation of flux in the air gap. Calculate the flux per pole.

   (b) Derive expressions for distribution factor and pitch factor. [8+8]

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