

Code No: 07A3EC13

**R07****Set No. 2**

II B.Tech I Semester Examinations, MAY 2011

**ELECTRICAL TECHNOLOGY**

Common to BME, ICE, E.COMP.E, ETM, E.CONT.E, EIE, ECE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

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1. A spring controlled moving iron voltmeter reads correctly on 250 V d.c. Calculate the scale reading when 250 V a.c. is applied at 50 Hz. The instrument coil has a resistance of 500 ohm and an inductance of 1 H and the series (non reactive) resistance is 2000 ohm. [16]
2. (a) Explain the principle of operation of dc motor with suitable diagram.  
(b) What are the different methods of speed control of dc shunt motor and explain any one of them in detail. [8+8]
3. (a) What is synchro?  
(b) What is synchro pair?  
(c) What is electrical zero of a synchro?  
(d) What is null position in synchro?  
(e) What is aligned position in synchro?  
(f) What are the applications of synchro?  
(g) What are the trade names of synchro?  
(h) What is the difference between synchro transmitter and receiver? [2×8=16]
4. A 4 KVA, 200/400V, 50Hz transformer gave the following test figures:

No Load:	Low voltage data:	200V	0.7A	60W
Short Circuit:	High voltage data:	9V	6A	21.6W

Calculate the magnetizing current and component corresponding to iron loss at normal voltage and frequency. Find the efficiency on full load at unity power factor and half full load at 0.8 lagging p.f. Also determine the regulation at full load at 0.8 lagging power factor and at half-full load at 0.707 leading power factor. [16]

5. (a) A compound generator is to supply a load of 250 lamps, each rated at 100 W, 250V. The armature, series and shunt windings have resistances of 0.05 ohms, 0.03 ohm and 50 ohms respectively. Determine the generated emf when the machine is connected in:
  - i. long shunt and
  - ii. short shunt.
- (b) Explain the principle of operation of dc generator. [10+6]

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6. (a) Starting from first principles develop the equivalent circuit of a transformer.  
(b) A transformer with an output voltage of 75V supplies a load consisting of  $33.5\Omega$  resistance and  $22\Omega$  ohm inductive reactance. Find input voltage, current and power factor, if the transformer has following parameters:  $N_1/N_2 = 3/2$ ,  $R_1=2\Omega$ ,  $X_1=5\Omega$ ,  $R_0 = 7500\Omega$ ,  $X_0 = 3000\Omega$ ,  $R_2= 0.25\Omega$  and  $X_2= 1.2\Omega$ . [8+8]
7. (a) Draw the torque speed characteristics of a 3 phase induction motor.  
(b) Derive the expression for the starting torque to Maximum torque. [8+8]
8. (a) Derive the relation between speed and frequency.  
(b) Explain the two types of rotors used in alternators with neat sketch. [8+8]

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- long shunt and
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- (b) Explain the principle of operation of dc generator. [10+6]
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 (f) What are the applications of synchro?  
 (g) What are the trade names of synchro?  
 (h) What is the difference between synchro transmitter and receiver? [2×8=16]
3. (a) Starting from first principles develop the equivalent circuit of a transformer.  
 (b) A transformer with an output voltage of 75V supplies a load consisting of 33.5Ω resistance and 22 Ω ohm inductive reactance. Find input voltage, current and power factor, if the transformer has following parameters:  $N_1/N_2 = 3/2$ ,  $R_1=2 \Omega$ ,  $X_1=5 \Omega$ ,  $R_0 = 7500 \Omega$ ,  $X_0 = 3000 \Omega$ ,  $R_2= 0.25 \Omega$  and  $X_2= 1.2 \Omega$ . [8+8]
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Calculate the magnetizing current and component corresponding to iron loss at normal voltage and frequency. Find the efficiency on full load at unity power factor and half full load at 0.8 lagging p.f. Also determine the regulation at full load at 0.8 lagging power factor and at half-full load at 0.707 leading power factor. [16]

5. (a) Explain the principle of operation of dc motor with suitable diagram.  
 (b) What are the different methods of speed control of dc shunt motor and explain any one of them in detail. [8+8]

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6. (a) Derive the relation between speed and frequency.  
(b) Explain the two types of rotors used in alternators with neat sketch. [8+8]
7. A spring controlled moving iron voltmeter reads correctly on 250 V d.c. Calculate the scale reading when 250 V a.c. is applied at 50 Hz. The instrument coil has a resistance of 500 ohm and an inductance of 1 H and the series (non reactive) resistance is 2000 ohm. [16]
8. (a) Draw the torque speed characteristics of a 3 phase induction motor.  
(b) Derive the expression for the starting torque to Maximum torque. [8+8]

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**R07****Set No. 1**

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- long shunt and
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5. (a) Starting from first principles develop the equivalent circuit of a transformer.
- (b) A transformer with an output voltage of 75V supplies a load consisting of 33.5Ω resistance and 22 Ω ohm inductive reactance. Find input voltage, current and power factor, if the transformer has following parameters:  $N_1/N_2 = 3/2$ ,  $R_1=2\ \Omega$ ,  $X_1=5\ \Omega$ ,  $R_0 = 7500\ \Omega$ ,  $X_0 = 3000\ \Omega$ ,  $R_2= 0.25\ \Omega$  and  $X_2= 1.2\ \Omega$ . [8+8]
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- (f) What are the applications of synchro?
  - (g) What are the trade names of synchro?
  - (h) What is the difference between synchro transmitter and receiver? [2×8=16]
7. (a) Derive the relation between speed and frequency.
- (b) Explain the two types of rotors used in alternators with neat sketch. [8+8]
8. (a) Explain the principle of operation of dc motor with suitable diagram.
- (b) What are the different methods of speed control of dc shunt motor and explain any one of them in detail. [8+8]

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- (b) A transformer with an output voltage of 75V supplies a load consisting of  $33.5\Omega$  resistance and  $22\Omega$  ohm inductive reactance. Find input voltage, current and power factor, if the transformer has following parameters:  $N_1/N_2 = 3/2$ ,  $R_1=2\Omega$ ,  $X_1=5\Omega$ ,  $R_0 = 7500\Omega$ ,  $X_0 = 3000\Omega$ ,  $R_2= 0.25\Omega$  and  $X_2= 1.2\Omega$ . [8+8]
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