

Code No: RR310205

RR

Set No. 2

III B.Tech I Semester Examinations, November 2010

ELECTROMECHANICS-III

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Explain the necessity of parallel operation of alternators.
 (b) Two 50MVA, 3-phase alternators operate in parallel. The settings of the governors are such that the rise in speed from full-load to no-load is 2% in one machine and 3% in the other, the characteristics being straight lines in both cases. If each machine is fully loaded when the total load is 100MW, what will be the load on each machine when the total load reduced 60MW? [8+8]
2. (a) What could be the reasons if a synchronous motor fails to start?
 (b) The synchronous reactance per phase of a 3-phase star connected 6600V synchronous motor is 10Ω . For a certain load, the input is 900KW and the induced line emf is 8900V(line value). Evaluate the line current. Neglect resistance. [8+8]
3. (a) Explain about different torques of a synchronous motor?
 (b) A 400V, 3-phase synchronous motor takes 52.5A at a power factor of 0.8 leading. Calculate the power supplied and induced emf. The motor impedance per phase is $(0.25 + j3.2)\Omega$. [8+8]
4. (a) Explain why single phase induction motors are not self starting motors.
 (b) With suitable diagrams, explain the construction and working principle of AC series motor. [8+8]
5. (a) Explain the effect of harmonics on pitch and distribution factors.
 (b) An alternator has 18 slots/pole and the first coil lies in slots 1 and 16. Calculate the pitch factor for
 - i. Fundamental
 - ii. 3rd harmonics
 - iii. 5th harmonics and
 - iv. 7th harmonics. [8+8]
6. (a) Compare synchronous impedance method and ampere -turn method of pre-determining regulation of alternators.
 (b) A 6600-V star -connected, 3-phase non -salient pole synchronous generator has the following open -circuit characteristic

Code No: RR310205

RR

Set No. 2

Phase voltage (V)	2600	3500	4130	4600	5000	5500
Field current(A)	100	150	200	250	300	400

Full load current on short circuit is obtained with an excitation of 175A. Using the ampere-turn method; determine the full-load regulation when the pf is 0.9 lagging. The resistance drop is negligible and the reactive drop is 10% on full load. [8+8]

7. (a) Show that the behavior of a synchronous machine on infinite bus is quite different from its isolated operation.
- (b) A 3-phase alternator has a direct-axis synchronous reactance of 0.7 p.u. and a quadrature axis synchronous reactance of 0.4 p.u. Draw the vector diagram for full-load 0.8 p.f. Lagging and obtain there from
- the load angle and
 - the no-load per unit voltage. [8+8]
8. (a) Draw and explain the phasor diagram of an alternator at lagging power factor.
- (b) Calculate the RMS value of the induced emf per phase of a 10 pole, 3-phase, 50Hz alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150°. The flux per pole has a fundamental component of 0.12Wb and a 20% third component. [8+8]

Code No: RR310205

RR

Set No. 4

III B.Tech I Semester Examinations, November 2010

ELECTROMECHANICS-III

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Explain the necessity of parallel operation of alternators.
 (b) Two 50MVA, 3-phase alternators operate in parallel. The settings of the governors are such that the rise in speed from full-load to no-load is 2% in one machine and 3% in the other, the characteristics being straight lines in both cases. If each machine is fully loaded when the total load is 100MW, what will be the load on each machine when the total load reduced 60MW? [8+8]
2. (a) Show that the behavior of a synchronous machine on infinite bus is quite different from its isolated operation.
 (b) A 3-phase alternator has a direct-axis synchronous reactance of 0.7 p.u. and a quadrature axis synchronous reactance of 0.4 p.u. Draw the vector diagram for full-load 0.8 p.f. Lagging and obtain there from
 - i. the load angle and
 - ii. the no-load per unit voltage. [8+8]
3. (a) Draw and explain the phasor diagram of an alternator at lagging power factor.
 (b) Calculate the RMS value of the induced emf per phase of a 10 pole, 3-phase, 50Hz alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150° . The flux per pole has a fundamental component of 0.12Wb and a 20% third component. [8+8]
4. (a) Explain about different torques of a synchronous motor?
 (b) A 400V, 3-phase synchronous motor takes 52.5A at a power factor of 0.8 leading. Calculate the power supplied and induced emf. The motor impedance per phase is $(0.25 + j3.2)\Omega$. [8+8]
5. (a) Explain the effect of harmonics on pitch and distribution factors.
 (b) An alternator has 18 slots/pole and the first coil lies in slots 1 and 16. Calculate the pitch factor for
 - i. Fundamental
 - ii. 3^{rd} harmonics
 - iii. 5^{th} harmonics and
 - iv. 7^{th} harmonics. [8+8]
6. (a) Explain why single phase induction motors are not self starting motors.

Code No: RR310205

RR

Set No. 4

- (b) With suitable diagrams, explain the construction and working principle of AC series motor. [8+8]
7. (a) Compare synchronous impedance method and ampere-turn method of pre-determining regulation of alternators.
- (b) A 6600-V star-connected, 3-phase non-salient pole synchronous generator has the following open-circuit characteristic

Phase voltage (V)	2600	3500	4130	4600	5000	5500
Field current(A)	100	150	200	250	300	400

Full load current on short circuit is obtained with an excitation of 175A. Using the ampere-turn method; determine the full-load regulation when the pf is 0.9 lagging. The resistance drop is negligible and the reactive drop is 10% on full load. [8+8]

8. (a) What could be the reasons if a synchronous motor fails to start?
- (b) The synchronous reactance per phase of a 3-phase star connected 6600V synchronous motor is 10Ω . For a certain load, the input is 900KW and the induced line emf is 8900V(line value). Evaluate the line current. Neglect resistance. [8+8]

Code No: RR310205

RR

Set No. 1

III B.Tech I Semester Examinations, November 2010

ELECTROMECHANICS-III

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the effect of harmonics on pitch and distribution factors.
(b) An alternator has 18 slots/pole and the first coil lies in slots 1 and 16. Calculate the pitch factor for
 - i. Fundamental
 - ii. 3rd harmonics
 - iii. 5th harmonics and
 - iv. 7th harmonics. [8+8]
2. (a) Explain the necessity of parallel operation of alternators.
(b) Two 50MVA, 3-phase alternators operate in parallel. The settings of the governors are such that the rise in speed from full-load to no-load is 2% in one machine and 3% in the other, the characteristics being straight lines in both cases. If each machine is fully loaded when the total load is 100MW, what will be the load on each machine when the total load reduced 60MW? [8+8]
3. (a) Explain why single phase induction motors are not self starting motors.
(b) With suitable diagrams, explain the construction and working principle of AC series motor. [8+8]
4. (a) Compare synchronous impedance method and ampere-turn method of pre-determining regulation of alternators.
(b) A 6600-V star-connected, 3-phase non-salient pole synchronous generator has the following open-circuit characteristic

Phase voltage (V)	2600	3500	4130	4600	5000	5500
Field current(A)	100	150	200	250	300	400

Full load current on short circuit is obtained with an excitation of 175A. Using the ampere-turn method; determine the full-load regulation when the pf is 0.9 lagging. The resistance drop is negligible and the reactive drop is 10% on full load. [8+8]

5. (a) What could be the reasons if a synchronous motor fails to start?
(b) The synchronous reactance per phase of a 3-phase star connected 6600V synchronous motor is 10Ω . For a certain load, the input is 900KW and the induced line emf is 8900V(line value). Evaluate the line current. Neglect resistance. [8+8]

Code No: RR310205

RR

Set No. 1

6. (a) Show that the behavior of a synchronous machine on infinite bus is quite different from its isolated operation.
- (b) A 3-phase alternator has a direct-axis synchronous reactance of 0.7 p.u. and a quadrature axis synchronous reactance of 0.4 p.u. Draw the vector diagram for full-load 0.8 p.f. Lagging and obtain there from
- the load angle and
 - the no-load per unit voltage. [8+8]
7. (a) Draw and explain the phasor diagram of an alternator at lagging power factor.
- (b) Calculate the RMS value of the induced emf per phase of a 10 pole, 3-phase, 50Hz alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150° . The flux per pole has a fundamental component of 0.12Wb and a 20% third component. [8+8]
8. (a) Explain about different torques of a synchronous motor?
- (b) A 400V, 3-phase synchronous motor takes 52.5A at a power factor of 0.8 leading. Calculate the power supplied and induced emf. The motor impedance per phase is $(0.25+j3.2)\Omega$. [8+8]

Code No: RR310205

RR

Set No. 3

III B.Tech I Semester Examinations, November 2010

ELECTROMECHANICS-III

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Explain about different torques of a synchronous motor?
(b) A 400V, 3-phase synchronous motor takes 52.5A at a power factor of 0.8 leading. Calculate the power supplied and induced emf. The motor impedance per phase is $(0.25 + j3.2)\Omega$. [8+8]
2. (a) Draw and explain the phasor diagram of an alternator at lagging power factor.
(b) Calculate the RMS value of the induced emf per phase of a 10 pole, 3-phase, 50Hz alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150° . The flux per pole has a fundamental component of 0.12Wb and a 20% third component. [8+8]
3. (a) What could be the reasons if a synchronous motor fails to start?
(b) The synchronous reactance per phase of a 3-phase star connected 6600V synchronous motor is 10Ω . For a certain load, the input is 900KW and the induced line emf is 8900V (line value). Evaluate the line current. Neglect resistance. [8+8]
4. (a) Compare synchronous impedance method and ampere-turn method of pre-determining regulation of alternators.
(b) A 6600-V star-connected, 3-phase non-salient pole synchronous generator has the following open-circuit characteristic

Phase voltage (V)	2600	3500	4130	4600	5000	5500
Field current(A)	100	150	200	250	300	400

Full load current on short circuit is obtained with an excitation of 175A. Using the ampere-turn method; determine the full-load regulation when the pf is 0.9 lagging. The resistance drop is negligible and the reactive drop is 10% on full load. [8+8]

5. (a) Explain the effect of harmonics on pitch and distribution factors.
(b) An alternator has 18 slots/pole and the first coil lies in slots 1 and 16. Calculate the pitch factor for
 - i. Fundamental
 - ii. 3^{rd} harmonics
 - iii. 5^{th} harmonics and
 - iv. 7^{th} harmonics. [8+8]

Code No: RR310205

RR

Set No. 3

6. (a) Explain the necessity of parallel operation of alternators.
- (b) Two 50MVA, 3-phase alternators operate in parallel. The settings of the governors are such that the rise in speed from full-load to no-load is 2% in one machine and 3% in the other, the characteristics being straight lines in both cases. If each machine is fully loaded when the total load is 100MW, what will be the load on each machine when the total load is reduced to 60MW? [8+8]
7. (a) Explain why single phase induction motors are not self starting motors.
- (b) With suitable diagrams, explain the construction and working principle of AC series motor. [8+8]
8. (a) Show that the behavior of a synchronous machine on infinite bus is quite different from its isolated operation.
- (b) A 3-phase alternator has a direct-axis synchronous reactance of 0.7 p.u. and a quadrature axis synchronous reactance of 0.4 p.u. Draw the vector diagram for full-load 0.8 p.f. Lagging and obtain there from
- the load angle and
 - the no-load per unit voltage. [8+8]
