CHAPTER WISE QUESTIONS

SUBJECT- EC-II

1. Alternator (Synchronous Generator)

SHORT QUESTION: -

1. Why will a 3-phase synchronous motor always run at synchronous speed?
2. What are the two classification synchronous machines?
3. Mention the methods of starting of 3-phase synchronous motor.
4. What are the principal advantages of rotating field system type of construction of synchronous machines?
5. Write down the equation for frequency of emf induced in an alternator.
6. What are the advantages of salient pole type of construction used for synchronous machines?
7. Why do cylindrical rotor alternators operate with steam turbines?
8. Which type of synchronous generators are used in Hydroelectric plants and why?
9. What is the relation between electrical degree and mechanical degree?
10. What is the relation between electrical degree and mechanical degree?
11. Write down the formula for distribution factor.
12. Define winding factor.
13. Why are alternators rated in kVA and not in kW?
14. What are the causes of changes in voltage of alternators when loaded?
15. What is meant by armature reaction in alternators?
16. What is synchronous impedance?
17. What is meant by load angle of an alternator?
18. Define the term voltage regulation of alternator.

LONG QUESTION: -

1. Discuss briefly the load characteristics of alternator for different power factor.
2. Explain dark lamp method of synchronizing an alternator with the bus bar.
3. Derive the equation of induced emf for an alternator.
4. Explain the operating principle of three-phase alternator.
5. Explain synchroscope method of alternator.
6. Explain Distribution Factor of alternator.
7. A 3-phase, 16-pole alternator has a star-connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 Wb, Sinusoidally distributed and the speed is 375 r.p.m. Find the frequency rpm and the phase and line e.m.f. Assume full-pitched coil.
8. In a 50-kVA, star-connected, 440-V, 3-phase, 50-Hz alternator, the effective armature resistance is 0.25 ohm per phase. The synchronous reactance is 3.2 ohm per phase and leakage reactance is 0.5 ohm per phase. Determine at rated load and unity power factor: (a) Internal e.m.f. Ea (b) no-load e.m.f. E_0 (c) percentage regulation on full-load (d) value of synchronous reactance which replaces armature reaction.
9. From the following test results, determine the voltage regulation of a 2000-V, 1-phase alternator delivering a current of 100 A at (i) unity p.f. (ii) 0.8 leading p.f. and (iii) 0.71 lagging p.f. Test results : Full-load current of 100 A is produced on short-circuit by a field excitation of 2.5A. An e.m.f. of 500 V is produced on open-circuit by the same excitation. The armature resistance is 0.8 Ω.

2. Synchronous Motor

SHORT QUESTION: -

1. What does hunting of synchronous motor mean?
2. What could be the reasons if a 3-phase synchronous motor fails to start?
3. What is synchronous condenser?
4. Write the applications of synchronous motor.
5. What is an inverted 'V' curve?

LONG QUESTION: -

1. Explain why a synchronous motor does not have starting torque.
2. Explain one method of starting a synchronous motor.
3. Does the change in excitation affect the p.f of the synchronous motor?
4. Explain what happens when the load on a synchronous motor is changed.
5. Explain briefly the principle of operation of three-phase synchronous motor.
6. Describe the effect of varying the excitation on the armature current and power factor of a synchronous motor when input power to the motor is maintained constant.

3. Induction motor

SHORT QUESTION: -

1. What are types of 3- phase induction motor?
2. Why are the rotor slots of a 3-phase induction motor skewed?
3. Why is the induction motor called asynchronous motor?
4. What are slip rings?
5. State the difference between slip ring rotor and cage rotor of an induction motor?
6. Write an expression for the slip of an induction motor.
7. Give the conditions for maximum torque for 3-phase induction motor?
8. List out the methods of speed control of cage type 3-phase induction motor?
9. What are the advantages of 3-phase induction motor?
10. What does crawling of induction motor mean?
11. State the application of an induction generator?

LONG QUESTION: -

1. Develop the equivalent circuit for 3-phase induction motor?
2. Explain the different speed control methods of squirrel cage induction motor.
3. Explain any one method of speed control of three- phase induction motor.
4. Explain how a rotating magnetic field is produced in a three-phase induction motor.
5. Describe with a neat diagram, the principle of operation of induction generator.
6. Explain starting Torque of an Induction Motor.
7. A 1100-V, 50-Hz delta-connected induction motor has a star-connected slip-ring rotor with a phase transformation ratio of 3.8. The rotor resistance and standstill leakage reactance are 0.012 ohm and 0.25 ohm per phase respectively. Neglecting stator impedance and magnetising current determine. (i) the rotor current at start with slip-rings shorted (ii) the rotor power factor at start with slip-rings shorted (iii) the rotor current at 4% slip with slip-rings shorted (iv) the rotor power factor at 4% slip with slip-rings shorted (v) the external rotor resistance per phase required to obtain a starting current of 100 A in the stator supply lines.

8. A 440-V, 3- φ, 50-Hz, 4-pole, Y-connected induction motor has a full-load speed of 1425 rpm. The rotor has an impedance of (0.4 + J 4) ohm and rotor/stator turn ratio of 0.8. Calculate (i) full-load torque (ii) rotor current and full-load rotor Cu loss (iii) Power output if windage and friction losses amount to 500 W (iv) maximum torque and the speed at which it occurs (v) starting current and (vi) starting torque.
9. The power input to the rotor of a 400 V, 50-Hz, 6-pole, 3- φ induction motor is 75 kW. The rotor electromotive force is observed to make 100 complete alterations per minute. Calculate: (i) slip (ii) rotor speed (iii) rotor copper losses per phase (iv) Mechanical power developed.
10. The power input to a 500 V, 50-Hz, 6-pole, 3-phase induction motor running at 975 rpm is 40 kW. The stator losses are 1 kW and the friction and windage losses total 2 kW. Calculate: (i) the slip (ii) the rotor copper loss (iii) shaft power and (iv) the efficiency.

4. Single Phase induction motor

SHORT QUESTION: -

1. Why single-phase induction motor has low power factor?
2. In which direction does a shaded pole motor run?
3. Differentiate between "capacitor start "and "capacitor start capacitor run "induction motor?
4. Name the two windings of a single-phase induction motor.
5. Give the names of three different types of single-phase motor.
6. What is the use of shading ring in a pole motor?
7. State any four use of single-phase induction motor.
8. What are the types of starters?
9. What is Ferrari's principle?

LONG QUESTION: -

1. Explain double revolving field theory.
2. Explain Working principle, Split phase motor.
   a. Capacitor Start motor.
   b. Capacitors start, capacitor run motor.
   c. Permanent capacitor type motor.
   d. Shaded pole motor

5. COMMUTATOR MOTORS:

SHORT QUESTION: -

1. What are the demerits of repulsion motor?
2. What is Universal Motor?
3. Application of series motor.
4. Application of Universal motor.

LONG QUESTION: -

1. Construction, working principle of single-phase series motor.
2. Construction, working principle and application of Universal motors.
3. Working principle of
   a. Repulsion start Motor,
   b. Repulsion start Induction run motor,
   c. Repulsion Induction motor.

6. SPECIAL ELECTRICAL MACHINE:

SHORT QUESTION: -

1. What is stepper motor?
2. Application of stepper motor.
3. Classification of stepper motor.

LONG QUESTION: -

1. Explain the working of steeper motor.
2. Explain reluctant stepper motor.
3. Explain Principle of Permanent magnet stepper motor.
4. Explain Principle of hybrid stepper motor.

7. THREE PHASE TRANSFORMERS:

SHORT QUESTION: -

1. What is Transformer?
2. What are the connections in 3-ph transformer?
3. Write the advantage of group of winding.

LONG QUESTION: -

1. Explain tap changer in transformer.
2. Explain Maintenance Schedule of Power Transformers.

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