Code No: 134AX

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, December - 2019
ELECTRICAL MACHINES – II
(Electrical and Electronics Engineering)

Time: 3 Hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) What are the advantages of 3-phase induction motor? [2]
  b) How do you compare 3-phase induction motor with transformer? [3]
  c) What is cogging in Three-phase Induction motor? [2]
  d) What is the working principle of Induction generator? [3]
  e) What is armature reaction in alternators? [2]
  f) Obtain the expression for voltage regulation of salient pole type alternator. [3]
  g) What is transient reactance of an alternator? [2]
  h) What is hunting phenomena in synchronous motor? [3]
  i) Give the applications of 1-phase capacitor start and run motor. [2]
  j) Explain the concept of double field revolving theory. [3]

PART-B
(50 Marks)

2.a) Explain the working principle of 3-phase induction motor.
  b) A 3 phase induction motor is wound for 4 pole and is supplied from 50 Hz
     system. Calculate (i) the synchronous speed (ii) the rotor speed when slip is 4%
     and (iii) rotor frequency when rotor runs at 600 rpm. [6+4]
OR
3.a) Deduce an expressions for rotor current, rotor e.m.f and p.f of a 3-phase induction
     motor at standstill and running conditions.
  b) Explain why a 3 phase induction motor at no load operates at a very low power
     factor. [6+4]

4.a) Describe with construction diagrams the working of Star delta starter.
  b) A 3 phase induction motor has a 4 pole, star connected stator winding and runs at
     220V, 50 Hz supply. The rotor resistance per phase is 0.1Ω and reactance 0.9Ω.
     The ratio of stator to rotor turns is 1.75. The full load slip is 5% calculate (i) load
     torque in Kg-m (ii) speed at maximum torque and (iii) rotor e.m.f at maximum
     torque. [5+5]
OR
5.a) Blocked rotor test determines which parameters of the circuit model of induction
     motor? Explain in detail.
  b) A SCIM has a starting current of six times the full load current at a slip of 0.04.
     Calculate the line current and starting torque in p.u. of full load values for the
     following methods of starting: (i) Direct switching (ii) Auto transformer starting
     with motor current limited to 2.0 p.u. (iii) Star-delta starting. [5+5]

6.a) Explain the procedure to find the voltage regulation of an alternator by M.M.F method.

  b) A 6600V, star connected, 3-phase non salient pole synchronous generator has the following O.C. characteristics:

Phase voltage(v)	2600	3500	4130	4600	5000	550
Field current(A)	100	150	200	250	300	400

Full load current on S.C. is obtained with an excitation of 175A. Using the ampere turn method, determine the full load regulation when the p.f. is 0.9 lagging. The resistance drop is negligible and the reactive drop is 10 percent on full load. [5+5]

OR

7.a) Explain the Integral slot and fractional slot windings of alternator.

  b) A 3 phase, 4 pole star connected alternator has 60 slots with 2 conductors per slot. The pitch of the coil is 3 slots less than the pole pitch. The flux/pole is 12.5×10^{-2} Wb sinusoidally distributed. Calculate the no load terminal voltage for a frequency of 50 Hz. [5+5]

8.a) Discuss the analysis of short circuit on the terminals of 3-phase synchronous generator.

  b) Discuss the conditions to be fulfilled for parallel operation of alternators. [5+5]

OR

9.a) Explain different starting methods of 3-phase synchronous motor.

  b) Two 1000 KVA, 3 phase alternators running in parallel. The setting of their governors is such that rise of speed from full load to no load of machine A is 2 percent and that of machine B is 3 percent, the speed load characteristics being straight lines in both cases.
  (i) If both machines are fully loaded when the total load is 2000 KVA, find the load on each machine when the load is 1166.6 KVA.
  (ii) Also find the load at which one machine ceases to supply any load. [5+5]

10.a) Explain the principle of operation and construction details of shaded pole motor.

  b) Explain the modifications required for a D.C motor to be operated on A.C supply. [5+5]

OR

11. Explain the working and constructional details of Single phase induction motor. Draw the circuit diagrams of different types of split phase single phase Induction motor. [10]

---ooOoo---