Code No: 134AX **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, April - 2018
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 is slip and slip speed of an Induction motor? [2]
b) Give the applications of 3-phase induction motor. [3]
c) What is crawling in Three-phase Induction motor? [2]
d) What is the principle of V/f speed control in Induction motor? [3]
e) What is pitch factor? [2]
f) Draw the load characteristics of an alternator. [3]
g) What is Synchronous reactance of an alternator? [2]
h) Write short note on Synchronous induction motor. [3]
i) State the disadvantages of single phase Induction motor. [2]
j) Give the applications of shaded pole induction motor. [3]

PART-B

(50 Marks)

2.a) Explain the R.M.F production in an 3-phase Induction motor.
b) A 3-phase induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate (i) the speed at which magnetic field of the stator is rotating. (ii) the rotor speed when slip is 4% and (iii) the frequency of the rotor currents when the slip is 0.03 and (iv) the frequency of the rotor currents when at stand still. [5+5]

OR

3. Explain the working of 3-phase Induction motor. Compare the constructional features of both squirrel cage induction motor and slip ring induction motor. Discuss the merits of one over the other. [10]

4.a) Sketch and explain torque-slip characteristic of an induction motor working at rated Voltage and frequency.
b) No load test determines which parameters of the circuit model of induction motor? Explain in detail. [5+5]

OR

5.a) Explain the speed control of 3-phase Induction motor by cascade connection.
b) A 6 pole, 50 Hz, 3 phase induction motor running on full load with 3% slip develops a torque of 160 N-m at its pulley rim. The friction and windage losses are 210W and the stator copper and iron losses equal 1640W. Calculate (i) Rotor output (ii) Rotor copper loss (iii) Efficiency at full load. [5+5]

6.a) Derive an expression for e.m.f induced in an alternator.

b) Calculate the r.m.s value of the induced e.m.f per phase of a 8 pole, 3 phase, 50 Hz alternator with 3 slots per pole per phase and 5 conductors per slot in two layers. The coil span is 140^0. The flux per pole has a fundamental component of 0.1 Wb and 15% third harmonic component. [5+5]

OR

7.a) Explain the procedure to find the voltage regulation of an alternator by A.S.A method.

b) Explain the suppression methods of harmonics generated in synchronous generator. [5+5]

8.a) Explain the variation of power factor and current of 3-phase synchronous motor with excitation.

b) A 3300V, star connected synchronous motor has synchronous impedance of (0.4+j5) Ω per phase. For an excitation e.m.f of 4000Vand motor input power of 1000kW at rated voltage, calculate the line current and power factor. [5+5]

OR

9.a) Discuss the conditions to be fulfilled for parallel operation of alternators.

b) A 10MVA, 11 KV, 1500 rpm, 50 Hz alternator runs connected across an 11 KV constant voltage constant frequency bus bars. The steady S.C. current is twice that full load current and the movement of inertia of the rotating machine is 20,000 Kg-m^2. Determine the synchronizing torque per degree of mechanical displacement and time for one complete oscillation for full load unity p.f. Neglect saliency and losses. [5+5]

10.a) Explain the concept of double field revolving theory.

b) What is split phase motor? Give the significance of split phasing. [5+5]

OR

11. Draw the circuit diagram of 1-phase capacitor start and induction motor. Explain its working with all constructional details. Sketch the performance characteristics of the motor. [10]

---ooOoo---