PVP 19

Code: 19EE3502

III B.Tech - I Semester – Regular Examinations – JANUARY 2022

ELECTRICAL MACHINES - II
(ELECTRICAL & ELECTONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 5 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each question carries 12 marks.
4. All parts of Question paper must be answered in one place

PART – A

1. a) Why an induction motor will never run at its synchronous speed? State the condition why the starting torque developed in a slip-ring induction motor is maximum.
   b) What is the magnitude of starting current & torque for induction motor?
   c) How does increase in excitation of the Alternator connected to infinite bus-bars affect the operation?
   d) Name the methods of starting synchronous motors. Write the applications of synchronous motor.
   e) What is the main basic difference between the principle of operation of a 3-phase and single-phase induction motors?

PART – B

UNIT – I

2. a) Derive an expression for the torque of an induction motor and draw the torque-slip characteristics, also obtain the condition for maximum torque. 6 M

b) A 100kW, 330V, 50Hz, 3 phase, star connected induction motor has a synchronous speed of 500 rpm. The full load slip is 1.8% and full load power factor 0.85. Stator copper loss is 2440W, iron loss is 3500W, rotational losses is 1200W. Calculate (i) rotor copper loss, (ii) the line current and (iii) the full load efficiency. 6 M

OR

3. a) Derive the Relation between full load torque and maximum torque. 6 M

b) Draw and explain the equivalent circuit of induction motor under loaded conditions. 6 M

UNIT – II

4. a) Explain the concept of Cogging and Crawling in 3 phase induction motor. 6 M

b) With neat diagrams explains the working of any two types of starters used for squirrel cage 3 phase induction motor. 6 M

OR

5. a) Discuss the different power stages of an induction motor with losses. 6 M

b) Explain briefly the various speed control schemes of induction motors. 6 M

UNIT-III

6. a) i) Derive the e.m.f equation of alternator. 6 M
   ii) Explain the pitch factor and distribution factor.
   b) A 3300V, 3phase star connected alternator has a full load current of 100A. On short circuit a field current of 5A was necessary to produce full load current. The emf on open circuit for the same excitation was 900V. The armature resistance was 0.8Ω/phase. Determine the full load voltage regulation for 6 M
   (i) 0.8pf lagging (ii) 0.8pf leading

OR

7. a) Describe construction and working of alternator. 6 M
   b) Two alternators working in parallel supply the following loads (i) lighting load of 500kW 6 M
   (ii) 1000kW at 0.9pf, (iii) 500kW at 0.9pf lead, (iv) 800kW at 0.8 lag. One alternator is supplying 1500kW at 0.95pf lagging. Calculate the load on the other machine.

UNIT – IV

8. a) Draw and explain the phasor diagram of a synchronous motor operating at lagging and leading power factor. 6 M
   b) A 1000 KVA, 11000 V, 3–phase star-connected synchronous motor has an armature resistance and reactance per phase of 3.5 Ω and 40 Ω respectively. Determine the induced emf and angular retardation of the rotor when fully loaded at 0.8 p.f. lagging and 0.8 p.f. leading. 6 M

OR

9. a) i) Explain the methods of starting synchronous motor against high-torque loads. 6 M

ii) Explain various torques associated with synchronous motor

b) Explain the principle of operation of stepper motor. 6 M

UNIT – V

10. a) Explain the working principle of single phase induction motor. Mention its four applications. 6 M

b) Explain about no load and blocked rotor test of single phase induction motor. 6 M

OR

11. a) Explain double revolving field theory. 6 M

b) Explain construction and operation of shaded pole motor. Also mention its applications. 6 M