Code No: 154AU

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year II Semester Examinations, April/May - 2023
ELECTRICAL MACHINES – II
(Electrical and Electronics Engineering)

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

Note: i) Question paper consists of Part A, Part B.
       ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
       iii) In Part B, Answer any one question from each unit. Each question carries 10 marks
           and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)   What is rotating magnetic field, give its importance in working of Induction motor?
                                                                      [2]
   b)   What is the rotor frequency during standstill conditions and give the voltage and current equations at that condition?   [3]
   c)   What are the parameters obtained in blocked rotor test and things that can be evaluated from the data?   [2]
   d)   List out various starting methods of Induction Motors and give the best method justify it.   [3]
   e)   Give the reasons for harmonics in Synchronous Machines and methods to reduce them.
                                                                       [2]
   f)   What is Potier triangle and steps to build it?   [3]
   g)   Give the necessary conditions for synchronizing of Synchronous Machines.   [2]
   h)   What is the impact of power factor on excitation of synchronous motor?   [3]
   i)   Mention various applications of Single phase induction motor.   [2]
   j)   Explain the important characteristics of shaded pole motor.   [3]

PART – B

(50 Marks)

2.a)   Describe with neat sketches the construction of a 3-phase cage type induction motor.
   b)   A 4pole, 50Hz induction motor runs with 4% slip at full load. What will be the frequency of current induced in the rotor (i) starting, (ii) at full load?   [6+4]

OR

3.a)   Explain the production of R.M.F in a 3-phase induction motor.
   b)   Calculate the speed in r.p.m. of a 6-pole induction motor which has a slip of 6% at full load with a supply frequency of 50Hz. What will be the speed of a 4-pole alternator supplying the motor?   [6+4]

4.a)   Explain the phenomenon of crawling and cogging in 3-ϕ IM.
   b)   A 3-phase induction motor has full load output of 18.65kW at 220V, 720 r.p.m. The full-load power factor is 0.83 and efficiency of 85%. When running light, the motor takes 5A at 0.2 power factor. Draw the circle diagram and use it to determine the maximum torque which the motor can exert (i) in Nm, (ii) in terms of full-load torque and (iii) in terms of the starting torque.   [4+6]

OR

5. Discuss briefly the various methods of speed control of 3-phase induction motors and justify the best method of starting the induction motors. [10]

6.a) Derive the emf equation for an alternator. Explain clearly the meaning of (i) distribution factor and (ii) coil span factor.
  b) Give the constructional details of 3-phase synchronous generator. [5+5]

OR

7. Explain the procedure to calculate the voltage regulation of an alternator by E.M.F method. [10]

8.a) Why bright lamp of synchronizing is preferred over dark lamp method explain?
  b) A 3-phase, 6600V, 50Hz star-connected synchronous motor takes 50A current. The resistance and synchronous reactance per phase are 1ohm and 20 ohms respectively. Find the power supplied to the motor and the induced e.m.f. for a power factor of (i) 0.8 lagging, (ii) 0.8 leading. [4+6]

OR

9.a) What is an infinite bus? State the characteristics of an infinite bus. What are the operating characteristics of an alternator connected to an infinite bus?
  b) Explain how synchronous motor operate and synchronous capacitor and mention its applications. [5+5]

10.a) Discuss why single-phase induction motors do not have a starting torque.
  b) Explain the double revolving field theory for single phase induction motors. [4+6]

OR

11.a) What are the disadvantages of single-phase induction motors when compared with a 3-phase induction motors?
  b) Explain the working principle of a split phase induction motor with the help of neat sketches. [4+6]

---ooOoo---